

BERICHTE

aus dem Fachbereich Geowissenschaften
der Universität Bremen

No. 251

Ruhland, G., N. Alamo,
L.S. Brammer, K. Dehning,
H. Kalweit, M. Klann,
J.J. Koester, E. Kopske,
C. Llerandi, M. Villagarcia

REPORT AND PRELIMINARY RESULTS OF
POSEIDON CRUISE 330
LAS PALMAS (SPAIN) - LAS PALMAS (SPAIN)
November 21st - December 03rd, 2005

Berichte, Fachbereich Geowissenschaften, Universität Bremen, No.251 ,
48 pages, Bremen 2006



ISSN 0931-0800

The „Berichte aus dem Fachbereich Geowissenschaften“ are produced at irregular intervals by the Department of Geosciences, Bremen University.

They serve for the publication of experimental works, Ph.D.-theses and scientific contributions made by members of the department.

Reports can be ordered from:

Monika Bachur
Forschungszentrum Ozeanränder, RCOM
Universität Bremen
Postfach 330 440
D 28334 Bremen
Phone: (49) 421 218 - 8960
Fax: (49) 421 218 - 3116
e-mail: mbachur@uni-bremen.de

Citation:

Ruhland, G. and participants

Report and preliminary results of Poseidon Cruise 330, Las Palmas – Las Palmas, 21.11.-03.12.2005.

Berichte, Fachbereich Geowissenschaften, Universität Bremen, No. 2xx, 48 pages, Bremen, 2006.

ISSN 0931-0800

CONTENTS

1.	Participants	4
2.	Research Objectives	5
2.1	MERSEA	5
3.	Narrative of the Cruise	6
4.	Scientific Report	8
4.1	Equipment Development and Tests	8
4.1.1	DOLAN-SBU	8
4.2	Collection with Particle Traps	16
4.2.1	MSD-5 (DOLAN)	16
4.2.2	CI-19 (ESTOC)	17
4.3	Marine Chemistry	18
4.3.1	Water Sampling and Analysis	23
4.3.2	Preliminary Results	25
4.3.3	Stable Nitrogen and Carbon Isotopes of Marine Particles	29
	4.3.3.1 Introduction	29
	4.3.3.2 Methods	29
	4.3.3.3 First Results	29
5.	List of Stations	30
6.	Acknowledgements	31
7.	References	32

1. Participants R/V Poseidon Cruise 330

<u>Name</u>	<u>Domain</u>	<u>Institution</u>
Ruhland, Götz	Marine Geology (Chief Scientist)	MARUM
Alamo, Nauzet	Marine Chemistry	ICCM
Brammer, Luca	Technician	SIO
Dehning, Klaus	Technician	MARUM
Kalweit, Holger	Technician	MARUM
Klann, Marco	Technician	MARUM
Kopiske, Eberhard	Technician	MARUM
Köster, Jana Jorina	Marine Geology	MARUM
Llerandi, Carolina	Marine Chemistry	ICCM
Villagarcía, Marimar, Dr.	Marine Chemistry	ICCM

Institutions

MARUM Zentrum für Marine Umweltwissenschaften der Universität Bremen, Leobener Str, 28359 Bremen, Germany

ICCM Instituto Canario de Ciencias Marinas, Apto. Correos 55, 35200 Telde de Gran Canaria, Spain

SIO Scripps Institution of Oceanography, UC San Diego, 8602 La Jolla Shores Drive, La Jolla, CA 92037

2. Research Objectives

The area off NW-Africa is one of the most important upwelling systems of the global ocean. High amounts of Sahara dust influence the transport of nutrients into and their concentration in the ocean and therefore play a major role for the particle production in the ocean influencing the processes of the biological carbon pump system. Hence they are controlling factors of the global atmospheric CO₂-budget. Despite the main driving force for climatic variability located in the North Atlantic, the upwelling area off NW-Africa is suitable to reconstruct the past climatic variability by monitoring present in-situ environmental changes and variations.

The research topics were carried out in correlation with the following project:

2.1 MERSEA (Marine EnviRonment and Security for the European Area – Integrated Project)

The main task will concentrate on the MERSEA EU project. The main aim of MERSEA is the data management and processing to take aim to the needs of scientific end-users.

The participating institutions during R/V POSEIDON cruise 330, MARUM/University of Bremen and ICCM, are involved in work package 3. They will ensure the availability of real time and delayed-mode and regional in-situ data and products in the form required by the MERSEA modelling, data assimilation and validation systems. The activities are partly research and development, innovation, and partly demonstration. The served research sites, continued from the preceding ANIMATE and DOLAN projects, are DOLAN/ESTOC, Canary Islands; PAP, Porcupine Abyssal Plain; CIS, Central Irminger Sea. The main task during POS 330 cruise will be the work on the DOLAN site. The DOLAN station is located 25nm west of ESTOC and comprises technical devices for transmission of scientific data sets via satellite into the internet and research institutes.

3. Narrative of the Cruise

R/V Poseidon left the port of Las Palmas on November 21st with heading to the DOLAN position. The scientific work started with the recovery of the DOLAN buoy in the late afternoon. For the post calibration of the DOLAN sensors a CTD/rosette cast was run to 500m water depth close to the DOLAN position.

On November 22nd, the monthly monitoring ESTOC station was sampled using a 12 bottle CTD/rosette. This station was at the same time the first station of a CTD/rosette transect between the islands of Gran Canaria and Tenerife down to 27°10'N. This six station transect was continued for three days. Every station consisted of two casts, one two 2000m (except #3 and #6 which were operated to the bottom) and one of 800m water depth due to the fact that only a 12 bottle rosette was available.

In the morning of November 25th the mooring CI-18 which was located close to the ESTOC position was recovered. In the afternoon R/V Poseidon steamed to the DOLAN position further to the west to recover the MSD-5 mooring. Over night maintenance work for the deployment of the next mooring had been done while R/V POSEIDON went back to the ESTOC position.

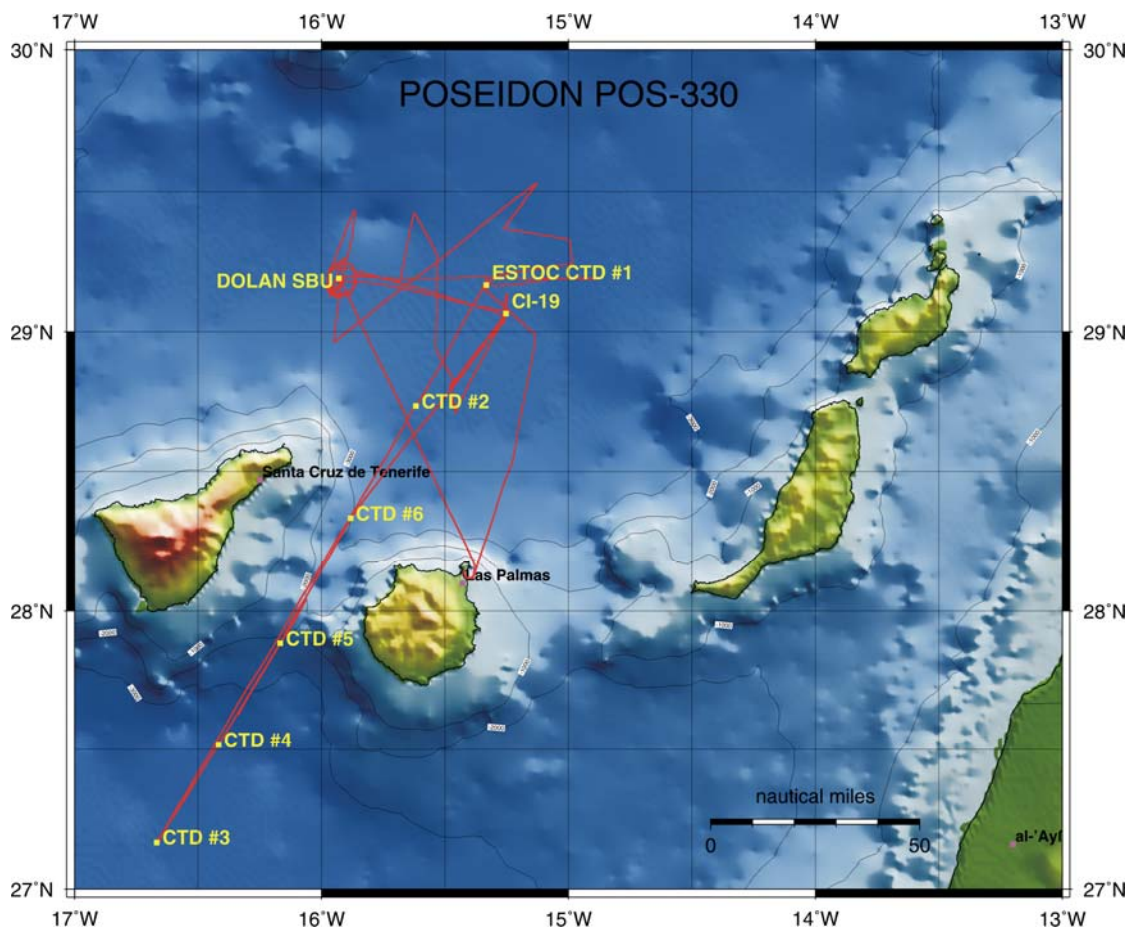


Figure 1: Cruise track R/V POSEIDON cruise 330.

The deployment of CI-19 at ESTOC started in the morning of November 26th and could be successfully completed until noon. In the afternoon a precalibration station with one MicroCat cast and one flurometer cast at the DOLAN position followed.

November, 27th the DOLAN surface buoy deployment has been prepared and the buoy was deployed together with the additional sensors. In the afternoon communication tests followed.

The next morning (November 28th) another CTD/rosette cast was made at ESTOC station as beginning of an west-east transect. After completing that first station the scientific work had to be stopped due to a cyclonic storm moving towards the working area. R/V POSEIDON had to steam to the harbour of Las Palmas immediately and arrived at 20.00h. Unfortunately R/V POSEIDON could not leave Las Palmas again on this cruise due to the stormy weather.

4. Scientific Report

4.1 Equipment Development and Tests

4.1.1 DOLAN Surface Buoy (SBU)

The Surface Buoy Unit (SBU) operates since 1997 and was formerly part of the DOMEST project. The unit carries several meteorological sensors, satellite telemetry links, a sub sea telemetry link using an ORCA acoustic modem, and additionally a cable telemetry down to 100m.

On December 21st the DOLAN mooring, which is located at 29°10,40'N 15°55,30'W at a water depth of 3630m was recovered. The last routine maintenance has been carried out during R/V POSEIDON cruise 320 in March 2005.

The redeployment took place six days later on December 27th.



Figure 2: Recovery of the SBU.



Figure 3: Recovered SBU.

While during R/V POSEIDON cruise 320 the DOLAN mooring array was completely recovered for maintenance it was only necessary to recover the upper 150m of the DOLAN mooring on the POS 330 cruise. The biofouling on the sensors and the buoy was at a low level compared to the POS 320 cruise in March. This seasonal change has been seen on all cruises. The sensors and the buoy had been cleaned before reading all the data from the sensors. For the redeployment of the buoy an upward looking ADCP has been installed in 150m water depth. It was removed on POS 320 for maintenance at the IFM-GEOMAR in Kiel.

There were no major damages visible on the buoy, all antennas, solar panels and cables on deck were in a good shape. Some minor damages like tight bearings of the windgenerator have been detected.

Status of the DOLAN Buoy before maintenance

- The INMARSAT tracking system installed in December 2004 worked perfectly until August 2005. The batteries were exhausted after this time four months earlier as calculated. The reason for this effect could be the very high current peak drawn during transmission. The battery capacity installed on the POS 330 cruise has been doubled according to this result.
- The wind sensor and the compass were working fine during the tests.
- The air pressure sensor has been working well all the time and the data had been transmitted on the online telemetry during the whole past mooring period. This sensor has not been replaced.
- The weather sensors with relative humidity and air temperature were damaged. We suppose that they were in contact with sea water during bad weather. They have been replaced. The readings have been successfully compared to the ships weather sensors (DWD system).
- The DOLIX GPS including antenna was working well.
- There was no SAMI CO₂ sensor installed at 10m, only one Microcat. The Orbcomm telemetry of the MicroCat in 10m water depth worked very reliable during this mooring period. The biofouling was acceptable. The recorded data could be retrieved completely. There were five inductive microcats between 10m and 100m. They have been recovered and the data has been downloaded successfully. Only the data from the microcat at 150m could not be accessed. This microcat has been brought back to Bremen for maintenance.
- There was no ADCP at 150m, the ADCP had been shipped to Kiel for repair after the POSEIDON cruise 320.
- The fluorometer and the nutrient analyser in 100m water depth were only very slightly affected by biofouling. The copper shutter of the fluorometer worked well, so that its optical system has been found without a biofouling film. The intake of the nutrient analyser was not affected by biofouling as well. Both sensors were operated independently from the telemetry.

The maintenance of the buoy electronics shows that the buoy was in a good shape. Both, 12V and 24V power supply were working well.

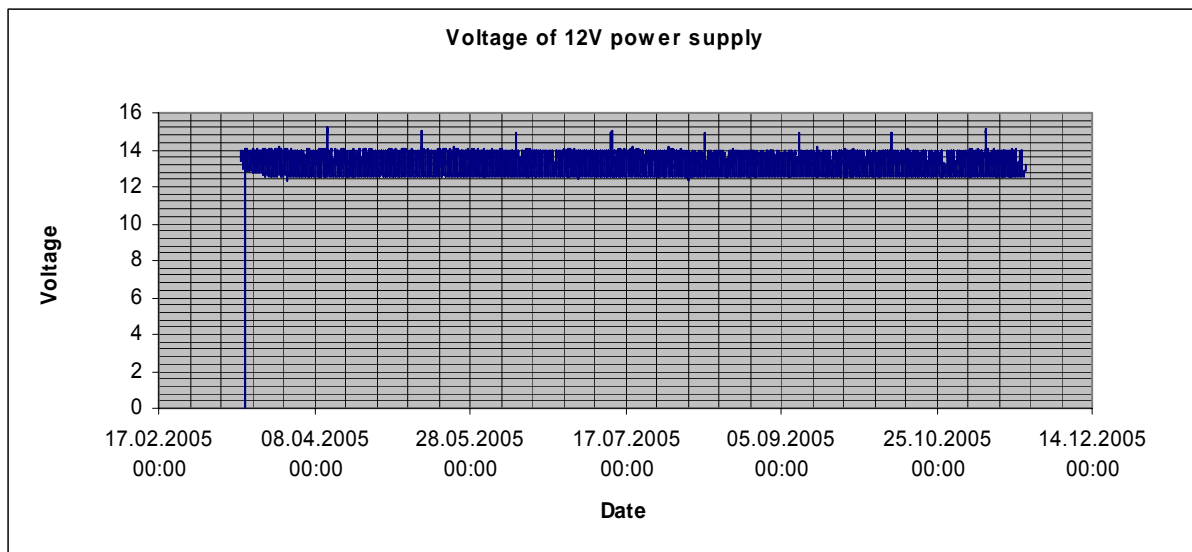


Figure 4: Plot of the 12V power supply during the deployment period.

The voltage of the 24V power supply is shown below. No problems have been detected in the 24V power supply.

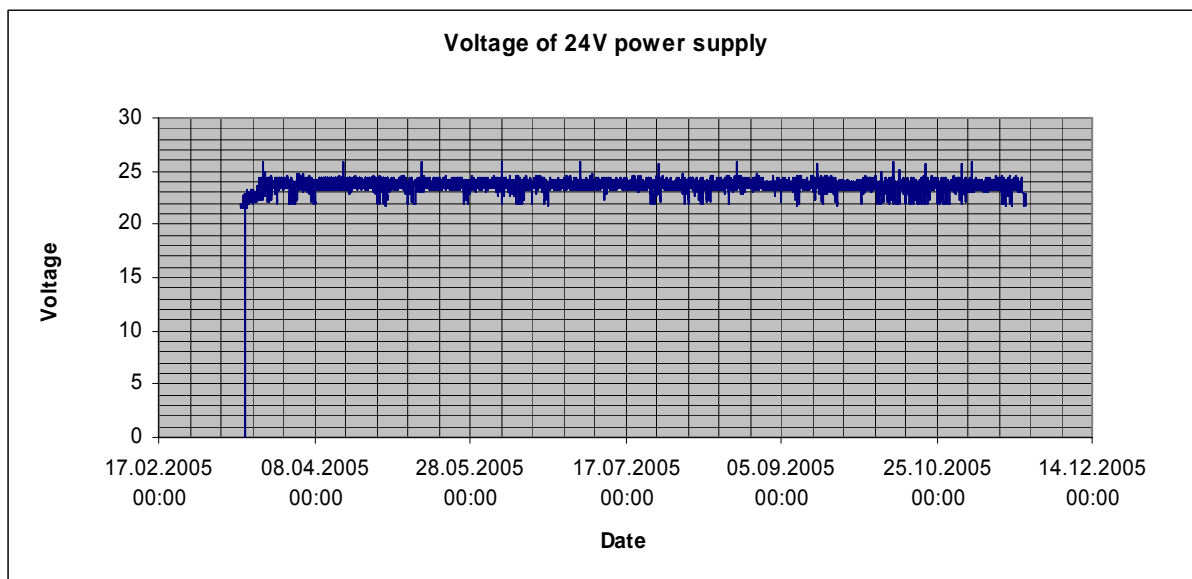


Figure 5: Plot of the 24V power supply during the deployment period.

The inspection of the 24V windgenerator shows that the bearings were corded. The wind generator has been replaced by a spare part.

After the analysis of the status of the DOLAN Buoy the maintenance of the DOLAN electronics has been started. The DOLIX computer has been replaced by the tested spare unit.

New sub seacable telemetry

A new technique for the telemetry of data from the sensors at 100m depth has been developed during the last mooring period in Bremen. This new telemetry has been installed the first time on the DOLAN buoy. The 4-wire cable is a new design with a robust stainless steal amour. The installation worked well with the connected nutrient analyser, the fluorometer, and a Microcat CTD.

New WLAN link

The old Satel RF modems have been replaced by a new WLAN link for controlling the system from the ship. The according antenna has been installed on this cruise.

Additional new Sensors

- Also a new fluorometer has been integrated into the system. The HS2 Fluorometer (Hobilabs) has been replaced by a new WetLabs fluorometer.
- The nutrient analyser has also been replaced by another type of sensor. The new sensor did not perform the schedule well, so it has been decided not to put the sensor into the cable telemetry.
- The structure / software of the Orbcomm telemetry has been completely redesigned because the SAMI CO₂ sensor is no longer present in the system. The scheduler function of the SAMI has been replaced by the use of an RTC in the Orbcomm telemetry.
- One additional MicroCat at 0.5m has been installed onto the buoy and integrated in the software.
- There is one more MicroCat installed in a water depth of 100m and connected to the Iridium telemetry.

Several messages have been automatically generated and sent via the Iridium and the Orbcomm satellite link.

The wind speed and wind direction data have been compared with the ships wind data (DWD system). The results were reasonable but due to the fact that the buoy was standing on the aft deck the readings were not exact the same as the ships wind data.

Overview on the installed sensors / telemetry since December 2005

Sensor	Telemetry	Status
Vaisala PTU200 - air temperature - relative humidity - barometric pressure	ORBCOMM	ONLINE But air temperature and humidity damaged by storm
Vaisala WS245 - windspeed - winddirection	IRIDIUM	ONLINE
TCM2 - buoy heading	Working, delivers data for wind speed	

- pitch and roll for the buoy	calculation	
Thrane & Thrane - GPS	INMARSAT	ONLINE
MicroCat @0.5m	ORBCOMM	Status unclear
MicroCat @10m	ORBCOMM	Status unclear
MicroCat @100m	IRIDIUM	(ONLINE)
Fluorometer	IRIDIUM	(ONLINE)
Nutrient Analyser NAS-3E	Not in telemetry	
DOLIX GPS	IRIDIUM	ONLINE

Results of the tests before and after deployment

All tested sensors and systems were working well during the tests prior to the deployment. The tests after the deployment were successful as well. A successful login on the DOLIX computer via Iridium from Bremen could be performed and the system has been restarted after a check.

Status of the DOLAN system after the cyclone 'Delta'

The cruise had to be finished three days earlier as planned because of a tropic cyclone coming directly to the DOLAN position. Windspeeds of 151km/h have been measured on the island La Palma. The check of the system after the cyclone 'Delta' showed some damage on the DOLAN system. The position sensors show that the mooring is not broken and the systems are still working.

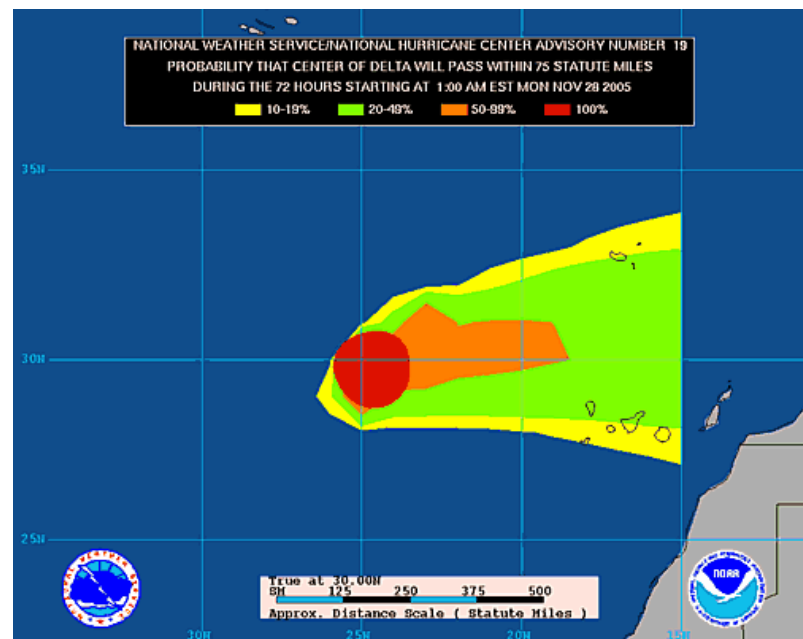


Figure 6: Probability of storm movement of the cyclone "Delta" in the working areas.

The weather sensor with air humidity and air temperature detection has been damaged by sea water. The DOLIX computer was still sending data, position reports and windspeed measurements, but the fluorometer and MicroCat data from 100m depth have not been sent any more. Further tries to dial in onto the DOLIX via Iridium were only partly successful. A connection to the Iridium modem on the buoy could be established, but an access the DOLIX computer was not possible.

DOLAN configuration December 2005

The sensors which have been maintained in Bremen were mounted on the DOLAN buoy again. Several new sensors have been implemented into the DOLAN system. Two new telemetry systems have been implemented and tested, the subsea telemetry for the 100m sensors and the WLAN telemetry. The transducer for the ORCA Modem has not been deployed again, because there are no acoustic clients deployed at this time.

Configuration of the DOLAN buoy after POS330

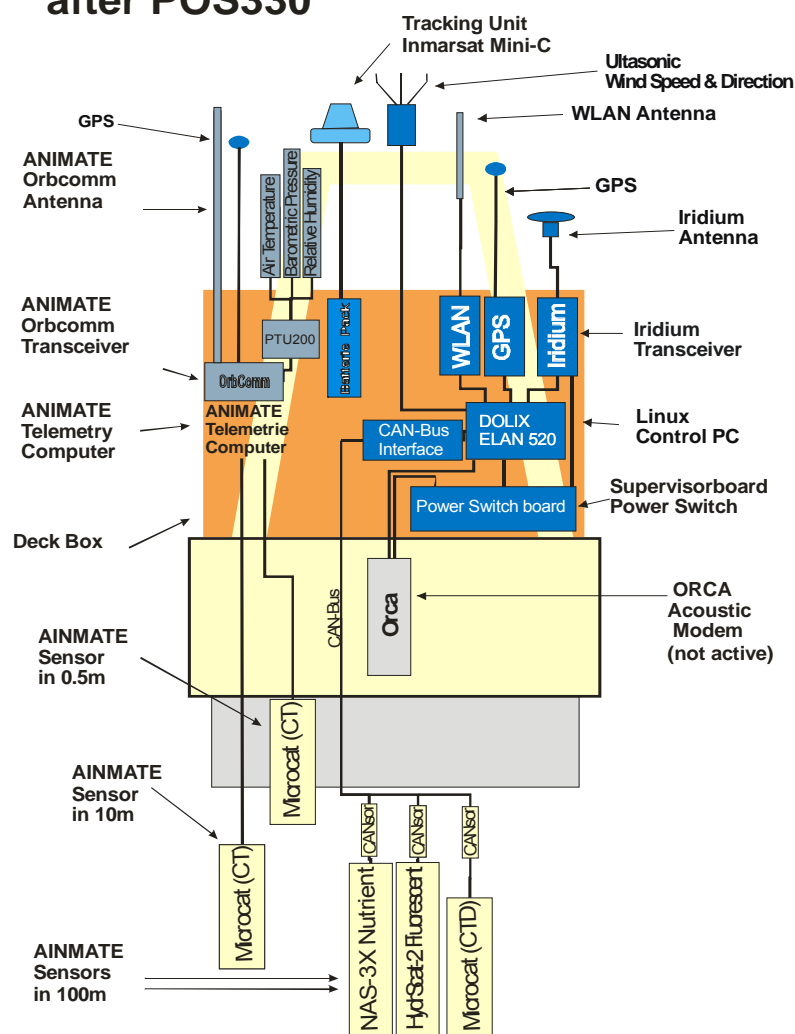


Figure 7: Configuration of the DOLAN SBU after POS 330.

The redeployment of the upper 150m of the mooring took place on the November 27th, 2005. Several final tests could not be performed due to the cyclone storm “Delta” which moved rapidly towards the DOLAN position. Tests of all sensors on the DOLIX took place after the deployment of the DOLAN buoy. All sensors like windspeed, fluorometer, MicroCat DOLIX GPS were working fine. These tests have been performed via the new WLAN link on the buoy.

The test of the maximum range of the WLAN link shows that a very stable communication with a signal level of -74dBi was possible at a distance of 500m. Also the internal Laptop WLAN cards could be used for this distance. The maximum distance where a communication was not longer reliable was 1km with a signal level of -90dBi. A high rate of lost packets makes a telnet connection instable at this distance. The tests show that WLAN at a distance of 500m is a very useful and reliable link for communication with the buoy.

Status of the tasks from the POS 330 cruise

- Implementation of a more stable power switch concept
Status: Still in progress, DOLIX is now permanently powered
- Implementation of an log concept for different units to determine the propagation of failures
Status: Has been installed and shows very valueable results for development and tests
- Development of an robust sub-sea cable link for the fluorometer and nutrient analyser in 100m depth
Status: Has been developed and installed, works well
- Monitoring of the power supply voltages (12V and 24V) via the DOLIX or the power switch board
Status: two independent monitors for the 12V and 24V power supply via Orbcomm link and via Iridium Link have been implemented, they are active

Tasks for the next cruise

- The power switching concept has to be redesigned
- A magnetic switch should be applied to switch on the WLAN link without opening the electronics box
- The scheduler of the DOLIX need to be checked, it seems not to be reliable
- The power supply concept for the different sensors need to be redesigned

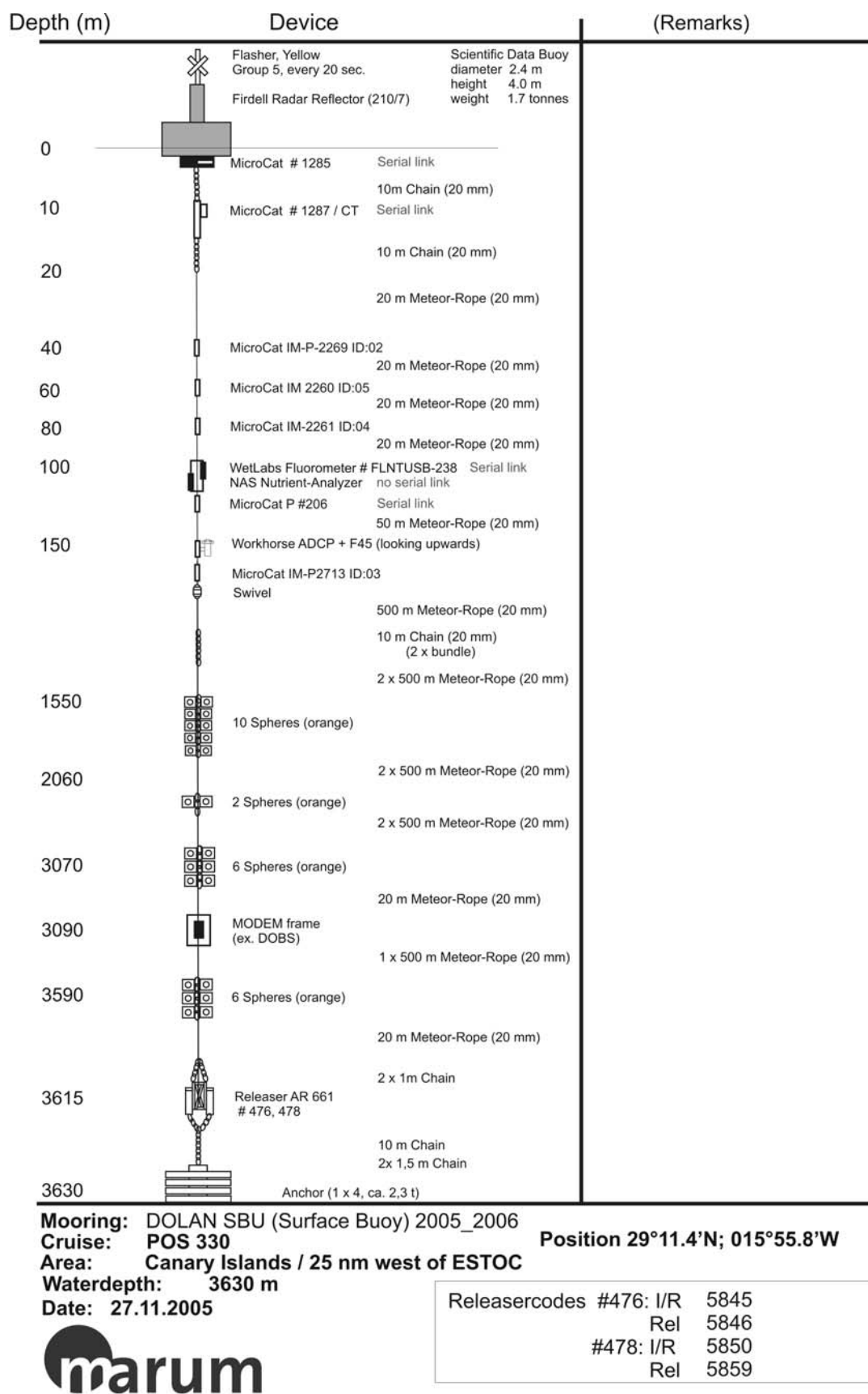


Figure 8: Drawing of the DOLAN-SBU mooring

4.2 Collection with Particle Traps

The particulate material collected will be analysed to determine total flux, particulate flux, particulate organic carbon, particulate nitrogen, biogenic opal, carbonate and stable isotopes of organic matter, and lithogenic material. The trapped material also will be investigated for species composition of the planktonic organisms (pteropods, foraminifera, coccolithophorides and diatoms). The objective of these studies is to identify signals of seasonal variations in those components, which play an important role in the sediment formation process. The result of these investigations will form a basis for the reconstruction of paleocurrent systems and paleoproduction from the sediments.

4.2.1 MSD- 5 (DOLAN)

The MSD-5 mooring was deployed on March 10th, 2005 at 29°12,80'N 15°50,60'W in a water depth of 3630m. On November 25th this mooring, which was equipped with a trap with two sample turntables, was recovered. The trap delivered a complete set of 40 samples covering a time interval from March 11th to November 6th, 2005. Due to the storm at the end of the cruise this mooring could not be deployed again.

Table 1: Mooring data for recoveries and redeployments during R/V POSEIDON cruise 330.

Mooring	Position	Water depth (m)	Interval	Instr. (m)	Depth	Intervals (no x days)
<u>Mooring recoveries</u>						
DOLAN MSD 5	29°012.80'N 015°50.60'W	3630	11.03.2005 06.11.2005	MSD	890	41 x 6
ESTOC CI-18	29°03.90'N 015°15.15'W	3590	16.03.2005 10.01.2006	S/MT 234	699 1025 3052	20 x 15
<u>Mooring deployments</u>						
ESTOC CI-19	29°04.20'N 015°15.36'W	3590	27.11.2005 25.02.2006	S/MT 234	699 1025 3052	20 x 4.5
Instruments used:						
MSD		= Multi Sensor Device with particle trap KUM, Kiel				
S/MT 234		= Particle sediment trap S/MT 234 KUM, Kiel				

4.2.2 CI-19 (ESTOC)

The CI-18 mooring was deployed on March 15th, 2005 at 29°03,90'N and 015°15,15'W at a water depth of 3590m. It has been recovered on November 25th, 2005. Attached to this array were three particle traps at water depths of 699m, 1025m and 3052m. All traps delivered a set of 17 samples, covering the time interval from March 16th to November 25th. The sample sets are not completed due to the fact that the recovery was originally planned for January, 2006.

The mooring was redeployed on November 26th, 2005 as CI-19, with a comparable configuration. It is planned to recover this mooring at the beginning of March, 2006 with R/V POSEIDON.

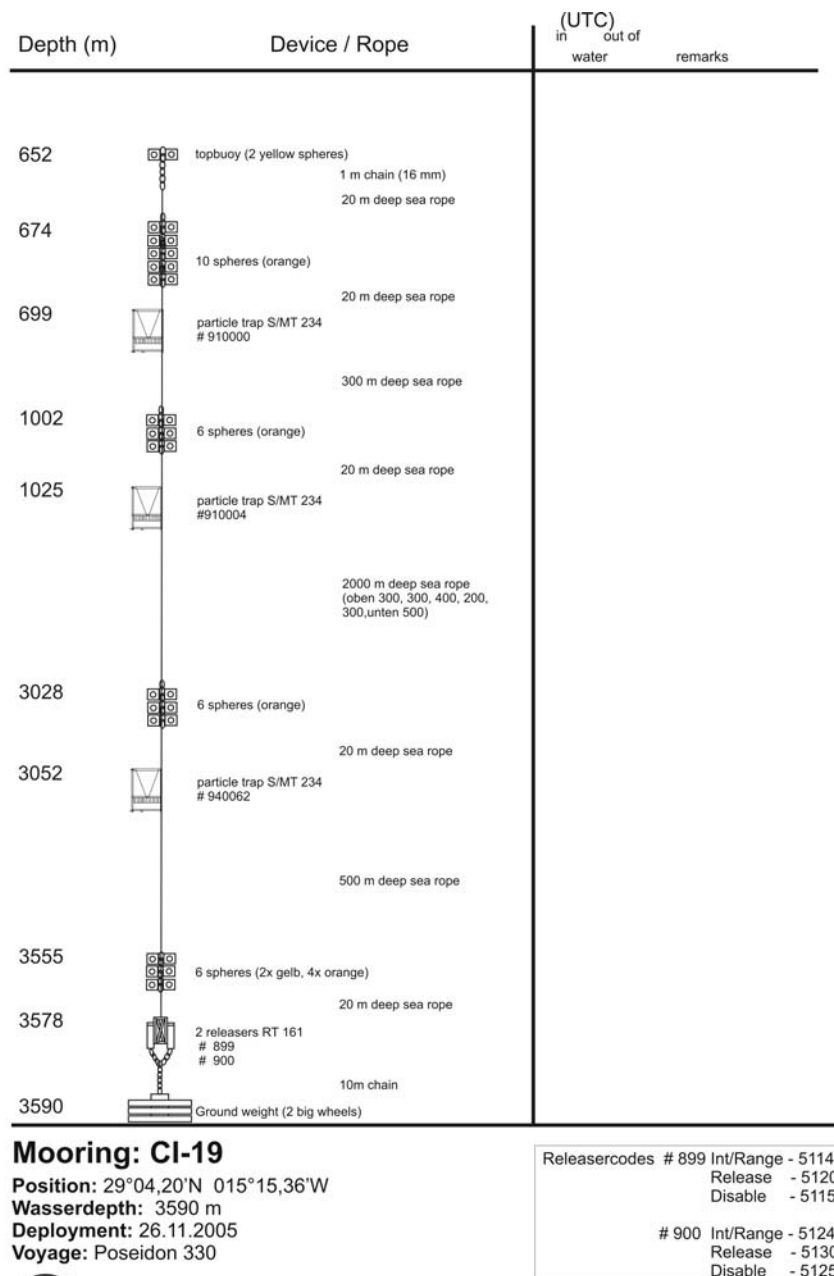


Figure 9: Drawing of CI-19 mooring

4.3 Marine Chemistry

Along POSEIDON cruise 330 the ICCM had to recover the nitrate sensor and extract the data. A new one was deployed because the one on place did not work adequately.

At the same time it was necessary to do the biogeochemical monthly samplings at the ESTOC station (European Station for Time series in the Ocean Canary Islands) and surrounded areas, that it has been continuously done since 1994. Calibration casts with CTD/Rosette were also made to accomplish the requirements of the sensors being recovered/deployed.

Further stations were made to check the intermediate waters in the passage between Tenerife and Gran Canaria Islands, with the aim to track the presence of the Antarctic Intermediate Water (AAIW). Variability of this water mass is found to the north of the archipelago due to the circulation through the passages between the different islands.

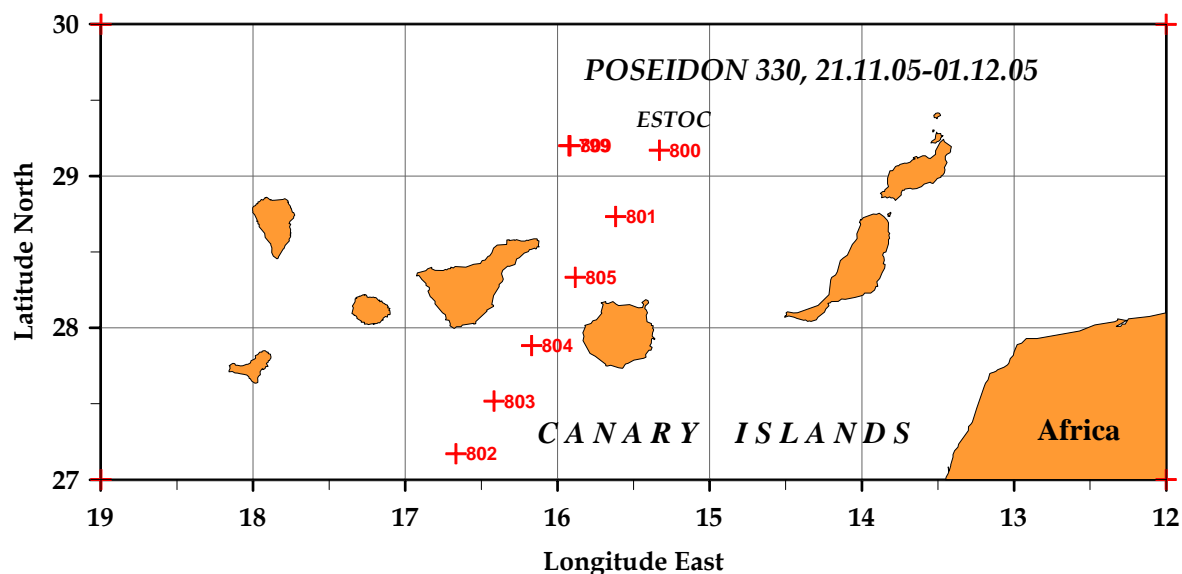


Figure 10: Position of the CTD stations (crosses) made along POSEIDON cruise 330.

At the beginning of the cruise the DOLAN/ANIMATE mooring had to be recovered, hence a rosette/CTD cast to 500m was made in order to have a calibration of the chemical sensors before their recovery (st. #799). Then, after the DOLAN mooring with the physical and biogeochemical sensors from the MERSEA was recovered, the ESTOC station monthly sampling took place (st. 800, sampled to the bottom). As part of the monthly sampling at ESTOC since 1994, a NOAA buoy #54678 was deployed at 29°07.34'N, 15°22.02'W.

After this, a transect between Tenerife and Gran Canaria islands were made starting from ESTOC and going diagonally south (st. 801-805 down to 2000m except station 802 that was made to the bottom), and finally a calibration was made prior to the mooring deployment (st. 809, to 500m). Other stations were planned to sample for $\delta^{15}\text{N}$ and coccolithophorids but only station #811 could be done to a depth of 1600m, because of the tropical storm DELTA, which started the 28.11.05. The vessel had to return to the port of Las Palmas due to bad ocean conditions.

The nitrate sensor was exchanged, collecting NAS-3X #2624 and deploying completely refurbished the NAS-2E #2404, changing the battery. Data obtained from the nitrate sensor were not satisfactory because the sensor colorimeter was saturated, always giving the same saturation value.

Table 2: List of stations sampled along the cruise POS 330, Las Palmas-DOLAN-Cape Blanc ANIMATE-DOLAN-Las Palmas (O=oxygen, N=nutrients, S=salinity, C=chlorophyll "a", Inc= Incidences) .

Date	Sta.# cast	Water depth	Lat. N	Long. W	Cast depth	Ni sk bo t.	Depth samp	PARAMETERS				
								O	N	S	C	Inc
21.11. 2005	799, 01	3586	29°11.34'	15°55.50'	500			Test cast for chemical pack calibration before recovery				
						1	500	√	√	√		
						2	200	√	√		√	
						3	150	√	√		√	
						4	125	√	√		√	
						5	100	√	√		√	
						6	90	√	√		√	
						7	80	√	√		√	
						8	70	√	√		√	
						9	55	√	√		√	
						10	40	√	√		√	
						11	25					Open
						12	10	√	√	√	√	
22.11. 2005	800, 01	3596	29°10.64'	15°19.74'	3500			Station ESTOC November 2005 Alk & pH (only this station) Alk pH				
						1	3500	√	√	√		√
						2	3000	√	√	√		√
						3	2800	√	√	√		√
						4	2500	√	√	√		√
						5	2000	√	√	√		√
						6	1800	√	√	√		√
						7	1500	√	√	√		√
						8	1300	√	√	√		√
						9	1200	√	√	√		√
						10	1100	√	√	√		√
						11	1000	√	√	√		√
						12	800	√	√	√		√
22.11. 2005	800, 02	3596	29°09.66'	15°19.78'	800			Station ESTOC November 2005 Alk & ¹³ C (this station) Alk ¹³ C				
						1	800	√	√	√		√
						2	600	√	√	√		√
						3	400	√	√	√		√
						4	300	√	√	√		√
						5	200	√	√	√	√	√
22.11. 2005	800, 02	3596	29°09.66'	15°19.78'	800			Station ESTOC November 2005 Alk & ¹³ C (this station) Alk ¹³ C				
						6	150	√	√	√	√	√
						7	125	√	√	√	√	√
						8	100	√	√	√	√	√
						9	75	√	√	√	√	√
						10	50	√	√	√	√	√
						11	25	√	√	√	√	Close at 10m
						12	10					Open

Table 2: continued

Date	Sta.# cast	Water depth	Lat. N	Long. W	Cast depth	Ni sk bo t.	Depth samp	PARAMETERS					Inc
								O	N	S	C		
22.11. 2005	801, 01	3586	28°44.03'	15°37.01'	2000			1 st station transect TF- GC Islands					
						1	2000	√	√	√		Closed at 787.9 db	
						2	1800	√	√	√		+Water for sed. Traps	
						3	1500	√	√			+Water for sed. Traps	
						4	1300	√	√			+Water for sed. Traps	
						5	1200	√	√				
						6	1100	√	√				
						7	1000	√	√				
						8	800	√	√				
						9	600	√	√				
						10	400	√	√				
						11	300	√	√				
						12	200	√	√	√			
22.11. 2005	801, 02	3585	28°44.07'	15°36.97'	200	1	200	√	√	√	√		
						2	175	√	√		√		
						3	150	√	√		√		
						4	125	√	√		√		
						5	110	√	√		√		
						6	100	√	√		√		
						7	90	√	√		√		
						8	75	√	√		√		
						9	50	√	√		√		
						10	25	√	√		√		
						11	10		√		√		
						12	10	√	√	√			
23.11. 2005	802, 01	3575	27°10.00'	16°40.00'	3500			2 nd Station transect TF- GC Islands					
						1	3500					Open	
						2	3000	√	√	√			
						3	2800	√	√				
						4	2500	√	√				
						5	2000	√	√				
						6	1800	√	√				
						7	1500	√	√				
						8	1300	√	√				
						9	1200	√	√				
						10	1100	√	√				
						11	1000	√	√			Closed at 800m	
						12	800	√	√	√			
23.11. 2005	802, 01	3575	27°10.00'	16°40.00'	800	1	800	√	√	√			
						2	600	√	√				
						3	400	√	√				
						4	300	√	√				
						5	200	√	√		√		
						6	150	√	√		√		
						7	125	√	√		√		
						8	100	√	√		√		
						9	75	√	√		√		
						10	50	√	√		√		
						11	25		√		√		
						12	10	√	√	√	√		

Table 2: continued

Date	Sta.# cast	Water depth	Lat. N	Long. W	Cast depth	Ni sk bo t.	Depth samp	PARAMETERS					Inc
								O	N	S	C		
23.11. 2005	803, 01	3507	27°31.01'	16°24.96'	2000			3 rd station transect TF- GC Islands					
						1	2000					Open	
						2	1800	√	√	√			
						3	1500	√	√				
						4	1300	√	√				
						5	1200	√	√				
						6	1100	√	√				
						7	1000	√	√				
						8	800	√	√				
						9	600	√	√				
						10	400	√	√				
						11	300	√	√				
						12	200	√	√	√			
23.11. 2005	803, 02	3502	27°31.02'	16°25.0'	200	1	200	√	√	√	√		
						2	175	√	√		√		
						3	150	√	√		√		
						4	125	√	√		√		
						5	110	√	√		√		
						6	100	√	√		√		
						7	90	√	√		√		
						8	75	√	√		√		
						9	50	√	√		√		
						10	25	√	√		√		
						11	10		√		√		
						12	10	√	√	√	√		
24.11. 2005	804, 01	2752	27°53.01'	16°10.03'	2000			4 th Station transect TF- GC Islands					
						1	2000	√	√	√			
						2	1800	√	√				
						3	1500	√	√				
						4	1300	√	√				
						5	1200	√	√				
						6	1100	√	√				
						7	1000	√	√				
						8	800	√	√				
						9	600	√	√				
						10	400	√	√				
						11	300	√	√				
						12	200	√	√	√			
24.11. 2005	804, 02	2752	27°53.01'	16°10.04'	200	1	200					Open	
						2	175	√	√	√	√		
						3	150	√	√		√		
						4	125	√	√		√		
						5	110	√	√		√		
						6	100	√	√		√		
						7	90	√	√		√		
						8	75	√	√		√		
						9	50	√	√		√		
						10	25	√	√		√		
						11	10		√		√		
						12	10	√	√	√			

Table 2: continued

Date	Sta.# cast	Water depth	Lat. N	Long. W	Cast depth	Ni sk bo t.	Depth samp	PARAMETERS					Inc
								O	N	S	C		
24.11. 2005	805, 01	3191	28°19.88'	15°52.99'	2000			5 th station transect TF- GC Islands					
						1	2000	√	√	√			
						2	1800	√	√				
						3	1500	√	√				
						4	1300	√	√				
						5	1200	√	√				
						6	1100	√	√				
						7	1000	√	√				
						8	800	√	√				
						9	600	√	√				
						10	400	√	√				
						11	300	√	√				
						12	200	√	√	√			
24.11. 2005	805, 02	3226	28°19.88'	15°52.99'	200	1	200					Open	
						2	175	√	√	√	√		
						3	150	√	√		√		
						4	125	√	√		√		
						5	110	√	√		√		
						6	100	√	√		√		
						7	90	√	√		√		
						8	75	√	√		√		
						9	50	√	√		√		
						10	25	√	√		√		
						11	10		√		√		
						12	10	√	√	√			
26.11. 2005	809, 01	3628	29°11.34'	15°55.50'	300			Test microCats prior to mooring deployment					
26.11. 2005	809, 02	3628	29°11.96'	15°55.01'	500			Test cast for chemical pack calibration prior to deployment, fluorometer mounted					
						1	500	√	√	√			
						2	200	√	√		√		
						3	150	√	√		√		
						4	125	√	√		√		
						5	100	√	√		√		
						6	90	√	√		√		
						7	80	√	√		√		
						8	70					Open	
						9	55	√	√		√		
						10	40	√	√		√		
						11	25	√	√		√		
						12	10	√	√	√	√		
28.11. 2005	811, 01	3652	29°09.94'	15°19.78'	1800			Station for sampling on δ ¹⁵ N and Coccolithophorids δ ¹⁵ N Coccus					
						1	1600	√	√				
						2	1200	√	√				
						3	800	√	√				
						4	400	√	√				
						5	200	√	√				
						6	150	√	√				
						7	125	√	√				
						8	100	√	√				
						9	75	√	√				
						10	50	√	√				
						11	25	√	√				
						12	10	√	√				

Physical (CTD, salinity) and biogeochemical parameters (oxygen, nutrients, chlorophyll, alkalinity and pH were only taken at ESTOC for the CO₂ group from the Chemistry Dptm. of the University of Las Palmas) were measured in order to characterize the water masses present in the water column (Table 2). Certain number of the parameters (oxygen, chlorophyll filtration) were analysed on board after sampling, and others were taken frozen to the ICCM (nutrients and filters from chlorophyll, samples for alkalinity and ¹³C).

4.3.1 Water Sampling and Analysis

Samples from each depth were collected immediately after the Niskin bottles were on board. The sampling sequence was as follows:

Oxygen

Oxygen was taken in glass bottles of about 125ml of volume which were previously cleaned and washed with HCl acid and was fixed at once; then it was kept for at least six hours according to WOCE regulations and finally it was analysed at the laboratory on board R/V POSEIDON. The samples were analysed using the method described in the WOCE Operations Manual, WHP Office Report No. 68/91; the final titration point was detected using a Metrohm 665 Dosimat Oxygen Auto-Titrator Analyser.

Carbonate system measurements

Carbon system measurements, in this case pH and alkalinity, samples were taken in glass bottles and were fixed immediately on board.

The pH_t in total scale (mol (kg-SW)⁻¹) was measured following the spectrophotometric technique of Clayton and Byrne (1993) using the m-cresol purple indicator (DOE, 1994). 0.0047 pH units were added to the pH experimental values in order to take into consideration the recommendations by Lee et al. (2000). A system similar to that described by Bellerby et al. (1995) was developed in our lab. The pH_t measurements were carried out using a Hewlett Packard Diode Array spectrophotometer in a 25°C-thermostated 1-cm flow-cell using a Peltier system. A stopped-flow protocol was used to analyse seawater previously thermostated to 25°C for a blank determination at 730, 578 and 434 nm. The flow was restarted, and the indicator injection valve switched on to inject 10 µl dye through a mixing coil (2 m). Three photometric measurements were carried out for each injection in order to remove all dye effect on the seawater pH_t measurement. Repeatedly, seawater measurements of the different Certified Reference Materials (CRM provided by Dr. Dickson, Scripps Institution of Oceanography) samples gave a standard deviation of ± 0.0015 (n = 54).

The total alkalinity of seawater (A_T) was determined by titration with HCl to the carbonic acid end point using two similar potentiometric systems, as described in more detail by Mintrop et al. (2000). In order to yield an ionic strength similar to open ocean seawater, the HCl solution (25 l, 0.25 M) was made from concentrated analytical grade HCl (Merck®, Darmstadt, Germany) in 0.45 M NaCl. The acid was standardised by titrating weighed amounts of Na₂CO₃ dissolved in 0.7 M NaCl solutions. The total alkalinity of seawater was evaluated from the proton balance at the alkalinity equivalence point, pH_{equiv} = 4.5, according

to the exact definition of total alkalinity (Dickson, 1981). The performance of the titration systems was monitored by titrating different samples of certified reference material (CRM, batch 42) with known inorganic carbon and A_T values. The agreement between our data and CRM values was within $\pm 1.5 \mu\text{mol kg}^{-1}$. Total inorganic carbon (C_T) is computed from experimental values of pH_t and total alkalinity, using the carbonic acid dissociation constants of Mehrbach after Dickson and Millero (1987). This set of constants presented the best agreement between $C_T(\text{pH}, A_T)$ calculations and certified C_T values for CRM, batch 42, with a C_T residual of $\pm 3 \mu\text{mol kg}^{-1}$, $n=54$ (Millero, 1995, Lee et al., 1997).

Nutrients

Nutrients were taken in polypropylene bottles which were previously cleaned and washed with HCl acid and were completely dry. Samples were immediately frozen at -20°C , analysing them as soon as possible after arrival at the laboratory. Freezing the samples is a common practice; it does not or only in a non-significant way affects the nitrate+nitrite and the phosphate values (by a slight decrease) and is not noticeable in the silicate values (Kremling and Wenck, 1986; McDonald and McLunghlin, 1982).

The nutrients determination was performed with a segmented continuous-flow autoanalyser, a Skalar® San Plus System (ICCM).

Nitrate and Nitrite

The automated procedure for the determination of nitrate and nitrite is based on the cadmium reduction method; the sample is passed through a column containing granulated copper-cadmium to reduce the nitrate to nitrite (Wood et al., 1967), using ammonium chloride as pH controller and complexer of the cadmium cations formed (Strickland and Parsons, 1972). The optimal column preparation conditions are described by several authors (Nydahl, 1976; Garside, 1993).

Phosphate

Orthophosphate concentration is understood as the concentration of reactive phosphate (Riley and Skirpow, 1975) and according to Koroleff (1983a) is a synonym of “dissolved inorganic phosphate”. The automated procedure for the determination of phosphate is based on the following reaction: ammonium molybdate and potassium antimony tartrate react in an acidic medium with diluted solution of phosphate to form an antimony-phospho-molybdate complex. This complex is reduced to an intensely blue-coloured complex, ascorbic acid. The complex is measured at 880 nm. The basic methodology for this anion determination is given by Murphy and Riley (1962); the used methodology is the one adapted by Strickland and Parsons (1972).

Silicate

The determination of the soluble silicon compounds in natural waters is based on the formation of the yellow coloured silicomolybdic acid; the sample is acidified and mixed with an ammonium molybdate solution forming molybdosilicic acid. This acid is reduced with

ascorbic acid to a blue dye, which is measured at 810 nm. Oxalic acid is added to avoid phosphate interference. The used method is described in Koroleff (1983b).

Phytoplankton pigments

Pigments were measured using fluorimetric analysis, following the methodology described by Welschmeyer (1994). The determination was achieved using a fluorometer TURNER 10-AU-000.

Salinity

Salinity samples were taken in dark glass bottles which were previously cleaned and washed with HCl acid. Then, they were kept in boxes to protect them from light till analysis on land. Samples were measured with a salinometer, model Autosal 8400a, whose measurement range was between 0.005 - 42 (psu), with an accuracy of ± 0.003 , according to the manufacturer. It was calibrated following the manufacturer's information and standarizing it with IAPSO Standard Seawater. Salinity values were calculated as practical salinity according to Unesco (1978, 1984).

Chlorophyll

Chlorophyll samples of one litre of water were taken. The chlorophyll samples were filtered immediatelly and the filters were frozen subsequently at -20°C . Their analyses take place at the ICCM laboratory on land.

All samples were taken using the procedures established in the WOCE Operations Manual, WHP Office Report WHPO 91-1/WOCE Report No.68/91.

4.3.2 Preliminary Results

This cruise took place during autumn, which corresponds in surface waters and for this northeast Atlantic subtropical marine area to the time of the year when the seasonal thermocline - that was formed last summer - begins to break though still is found for all the CTD's; meanwhile, the mixed layer starts its development being found at a depth range of about 60-80m (Figure 11a). An exception was station 803 which had a very shallow layer of 35m depth, maybe due to the surface dynamicity of this location.

Some stations as DOLAN (st. 799 and 809 for P330, st. 2 and 17 for P320) and ESTOC (st. 800 and st. 4 respectively) were also sampled for comparison purposes, the corresponding results from P320 cruise sampling (Spring 2005) is also included as Figure 11b, showing that the mixed layer reaches about 200m of depth.

Below the surface layer, the temperature/salinity plots from the CTD's made during POS 330 denote the presence of the North Atlantic Central Water (NACW), which is always found as a straight transect, showing ranges for this area of $12-17.5^{\circ}\text{C}$ and 35.6-36.6 for temperature and salinity respectively (Figure 12).

At intermediate depths both the Antarctic Intermediate Water (AAIW) and the Mediterranean Water (MW) masses are found at different stages to the north of the Canary

Islands (Figure 3a). Ranges of temperature and salinity at depths of 800-1200 m in the Canary Islands environment are 5-12°C and 35.2-35.5 respectively. The limit of the presence of MW in this area is a salinity value of 35.5, and all the values recorded during this cruise are just below this detection limit (Llinás et al., 2003).

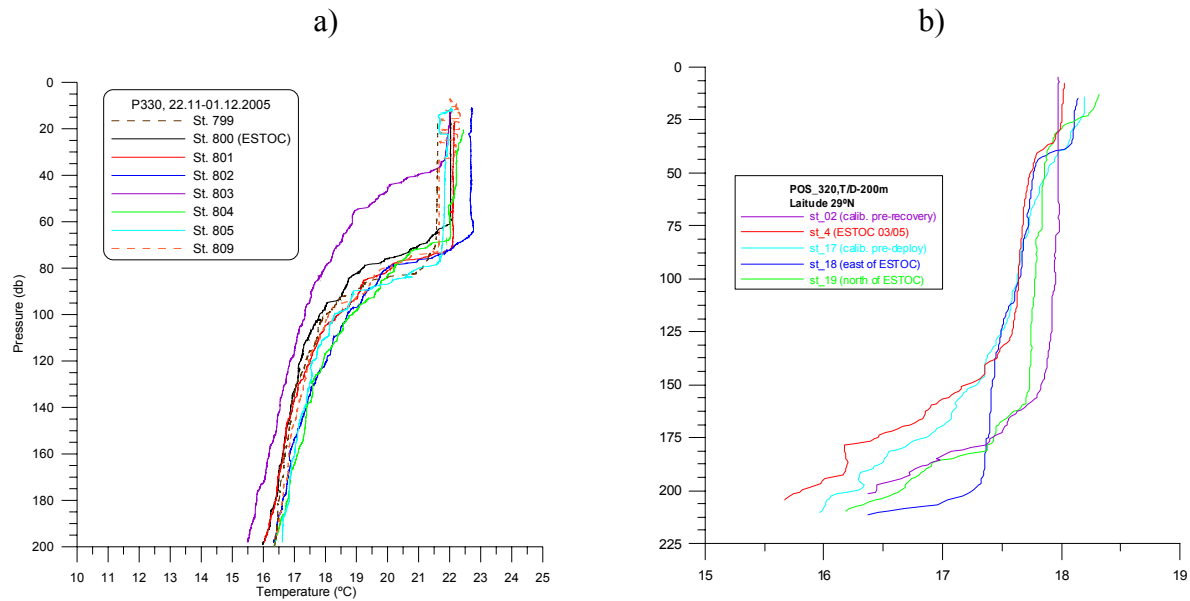


Figure 11: Potential temperature (°C, abscise) versus depth (m, ordinate) for the upper surface layer, around 200m deep. **(a).** DOLAN, ESTOC and transect between Tenerife and Gran Canaria Islands during cruise P330. **(b)** DOLAN and ESTOC during cruise POS 320.

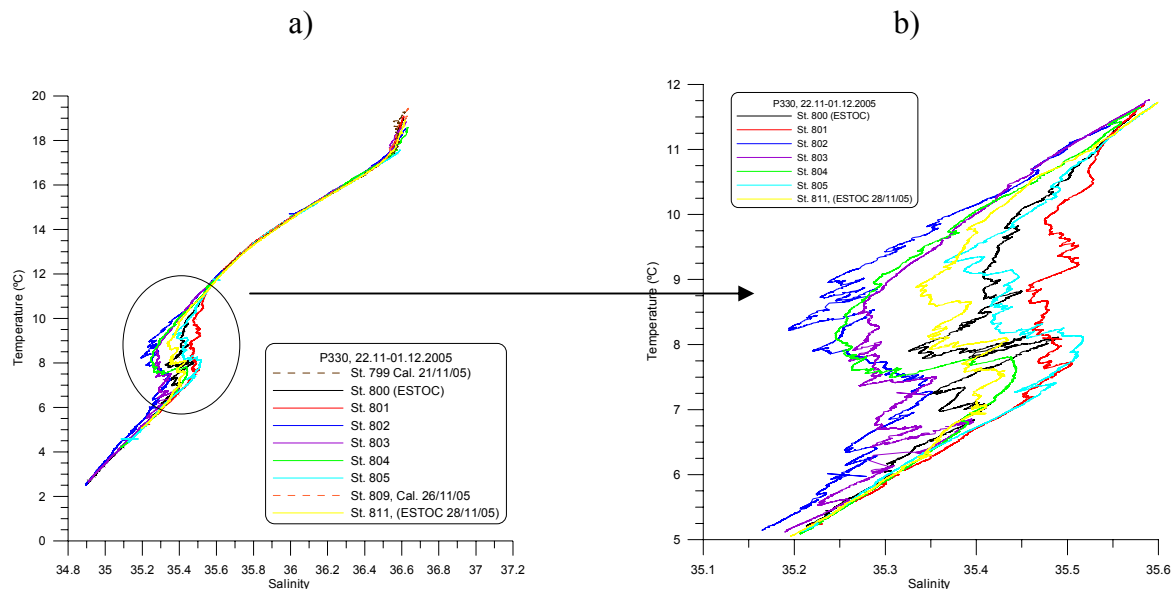


Figure 12: **a)** T/S plots from the stations made during POS 330, including DOLAN (only to 500m), ESTOC and the transect made between Gran Canaria and Tenerife. **b)** detail of the intermediate water masses mixing.

The passages between the islands are always controversial, due to the complex mixing - both vertical and horizontally - produced by the bulk process induced by the channelling of the water masses (Figure 12b). During POS 330 and for the core temperature range of the intermediate water masses (7-11°C), the stations located south of the islands (802, 803) are mainly composed of only AAIW (35.2-35.3 salinity), whereas the others stations sampled to the north or between the islands (800-801, 804-805) show mixing of both AAIW and MW, having a decreasing gradient of MW from north to south (35.5 to 35.35 of salinity variation).

The oxygen measured during POS 330 down to 3000m (Figure 13) show approximately the same trend, having the southern stations the lower values. The presence of AAIW is also pointed out by the relative minima, which is lower at the south though it is found at the same depth (800 m, 3.12 ml/l). Station 803 is a exception because it has a range between a southern and a northern station, with an oxygen minimum of 3.34 ml/l.

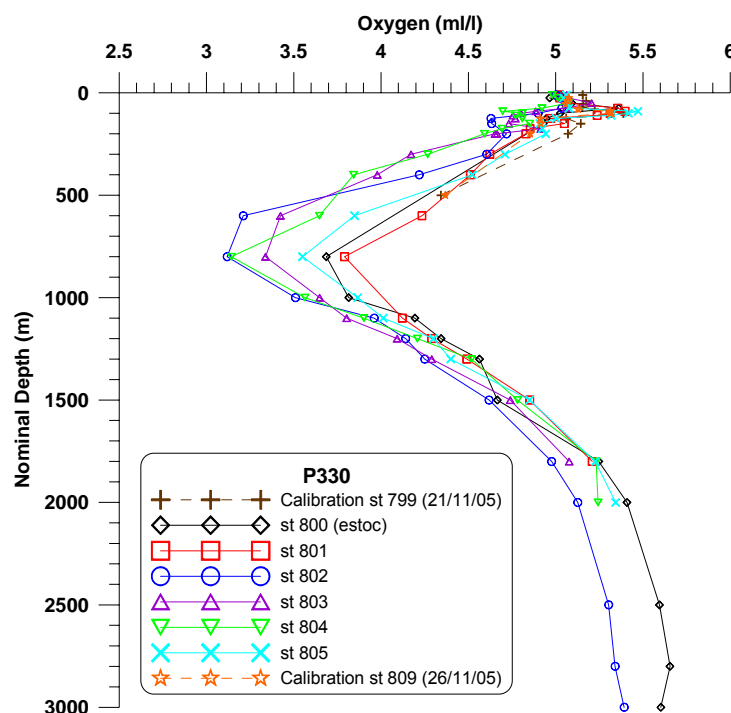


Figure 13: Oxygen (3000m depth) for the stations measured during POS 330, ESTOC 11/05 is depicted in black. Calibration stations by DOLAN (st. 799 and 809) were only made to 500m due to sensors depth restrictions.

A closer look to the T/S diagram shows some mixing of water at 7°C of temperature and 35.35 of salinity for pressures of 1300-1400 db, which could be the cause of greater oxygen values. The oxygen minima relative values in the north are of the order of 3.55 ml/l which are related to the MW presence for this season. The minima in the northern part ranges from 3.55 ml/l (st. 805) to 3.79 ml/l (st. 801), showing st. 800 (ESTOC) a value of 3.69 ml/l.

The chlorophyll „a“ and oxygen for the surface layer down to 200m are plotted in figure 14a and 14b respectively. The relative maximum of oxygen ranged from 5.47 ml/l (st. 805, between GC and TF to the north) to 5.05 ml/l in the southern most station (802), coinciding the depths mostly with those of chlorophyll „a“.

Values for chlorophyll ranged between 0 and 0.4 $\mu\text{g/l}$ along POS 330 for all the stations, showing the southern stations (802 - 804) slightly lower relative maxima values (less than 0.35 $\mu\text{g/l}$). The maximum were located between 50 and 75 db in the south and 75 - 90 db in the north. The variability found for the maxima at each station is related to the mixed layer formation effects already mentioned. Opposite to the spring cruise, during the autumn there are very low amounts of chlorophyll „a“ available in oligotrophic waters and a lot of mixing. Hence, the mixed layer starts to develop and the thermocline disappears as consequence of the water column getting homogeneous.

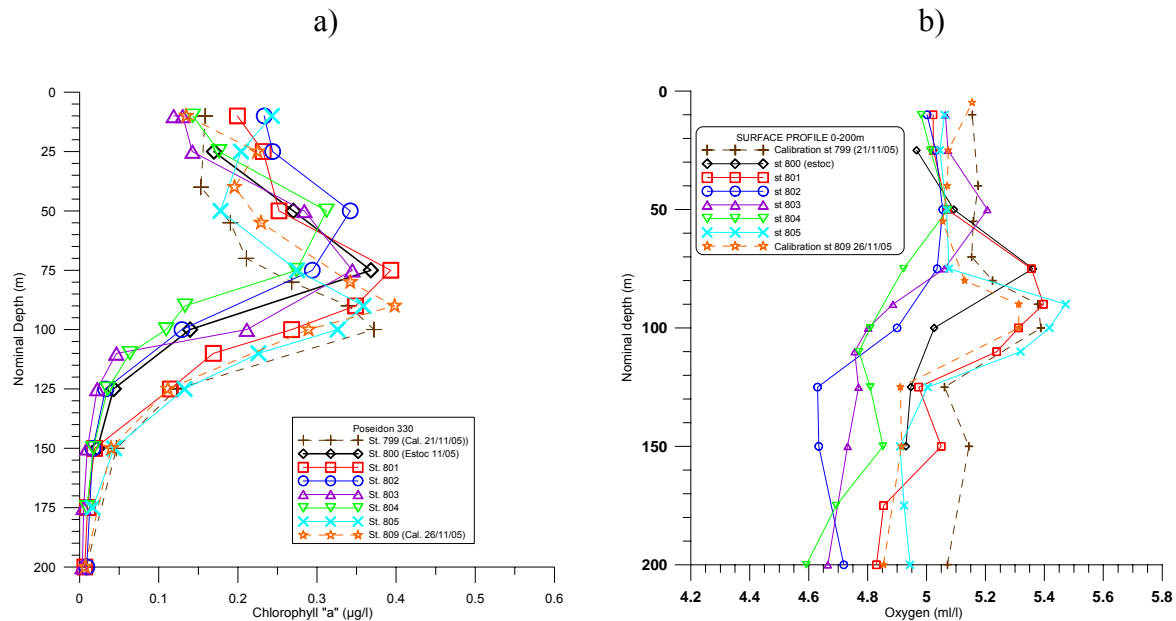


Figure 14: Chlorophyll „a“ ($\mu\text{g/l}$) to the left (a) and oxygen to the right (b) down to 200 m along POS 330; colours correspond between the graphs.

4.3.3 Stable Nitrogen and Carbon Isotopes of Marine Particles

4.3.3.1 Introduction

The origin of organic matter may be characterized by its chemical composition. Especially the stable nitrogen isotopes allow valuable insights into the production and degradation history of organic particles. Low values of the stable nitrogen isotope ratio $\delta^{15}\text{N}$ and high concentration of organic nitrogen and carbon are expected of material generated in an upwelling system. Higher $\delta^{15}\text{N}$ values, on the other hand, are typical of organic matter produced in oligotrophic systems. In addition, degradation of organic matter causes an enrichment of $\delta^{15}\text{N}$. In this study, the stable nitrogen isotope ratio as well as the carbon isotope ratio of particulate (mainly suspended) material will be determined and compared to the organic chemistry of fast sinking material sampled by particle traps. To get a better compendium of the isotopic composition of the different water masses influencing the particle trap sample isotope compositions, sea surface samples were also taken for nitrogen and carbon isotope measurements.

4.3.3.2 Methods

Vertical profiles (Rosette)

Water from selected depths, reaching from 10m water depth to near the sea floor, was sampled on certain rosette stations for analysis of $\delta^{15}\text{N}$ and $\delta^{13}\text{C}$ of particulate material. For stations see table 2.

For the rosette samples 5l of seawater from each depth and site were filtrated onto precombusted GGF-filters. The filters were dried at 60°C to inhibit chemical and biological reactions, which could have an influence on the isotope ratios. $\delta^{15}\text{N}$ and $\delta^{13}\text{C}$ will be measured using a Finnigan mass spectrometer. For the analysis the filters will be divided into halves, for one decalcified and one non decalcified series of measurements.

4.3.3.3 First Results

Vertical profiles (Rosette)

Assuming that the colour of the filters is an indicator of the particle concentration, first results can be seen based solely on the optical impression of the filters. As observable in the volumes at some stations it was impossible to filtrate 5l of seawater at each depth, due to the fact that the filters get plugged after a few litres. The particle concentration was highest in depths between 50m and 200m at each station.

Additional information will be expected by comparison of salinity and temperature data from the sea surface, and from each depth of CTD measurements (Tab. 2).

6. List of Stations

Station Number	Date (2005)	Time UTC	Description	LATITUDE		LONGITUDE		WD [m] +4,3m	Remarks
798	21.11.	18:19	DOLAN buoy aside	29°	10,65' N	015°	55,07' W	3628,0	Recovery SBU
		18:44	SAMI Analyser	29°	10,67' N	015°	54,93' W	3628,0	
		18:50	Transducer	29°	10,66' N	015°	54,89' W	3628,0	
		18:58	1. MicroCat	29°	10,70' N	015°	54,83' W	3628,0	
		19:01	2. MicroCat	29°	10,70' N	015°	54,82' W	3628,0	
		19:04	3. MicroCat	29°	10,70' N	015°	54,81' W	3627,0	
		19:11	NAS Nutrient Sensor	29°	10,68' N	015°	54,75' W	3628,0	
		19:24	DOLAN buoy	29°	10,69' N	015°	54,73' W	3627,0	
799	21.11.	20:22	CTD/Rosette	29°	11,29' N	015°	54,69' W	3629,0	Post-calibration cast
800	22.11.	08:12	CTD/Rosette	29°	10,17' N	015°	19,67' W	3597,0	ESTOC monitoring deep cast
800-2	22.11.	11:18	CTD/Rosette	29°	09,64' N	015°	19,78' W	3597,0	ESTOC monitoring
800-3	22.11.	12:28	NOAA-Drifter	29°	07,34' N	015°	15,22' W	3598,0	
801	22.11.	15:31	CTD/Rosette	28°	44,05' N	015°	36,98' W	3587,0	
801-2	22.11.	17:21	CTD/Rosette	28°	44,05' N	015°	36,92' W	3585,0	
802	23.11.	08:03	CTD/Rosette	27°	10,01' N	016°	40,00' W	3576,0	
802-2	23.11.	10:49	CTD/Rosette	27°	10,03' N	016°	40,00' W	3575,0	
803	23.11.	14:35	CTD/Rosette	27°	31,04' N	016°	24,99' W	3502,0	
803-2	23.11.	17:17	CTD/Rosette	27°	31,00' N	016°	24,98' W	3503,0	
804	24.11.	08:01	CTD/Rosette	27°	52,98' N	016°	10,01' W	2722,0	
804-2	24.11.	09:48	CTD/Rosette	27°	53,00' N	016°	10,02' W	2716,0	
805	24.11.	13:45	CTD/Rosette	28°	19,99' N	015°	53,01' W	3226,0	
805-2	24.11.	15:44	CTD/Rosette	28°	20,01' N	015°	52,99' W	3228,0	
806	25.11.	08:27	top buoy recognized	29°	03,53' N	015°	15,50' W	3588,0	Recovery CI-18
		08:55	top buoy	29°	04,25' N	015°	14,95' W	5391,0	
		09:14	2. particle trap	29°	04,13' N	015°	14,99' W	3589,0	
		10:29	3. particle trap	29°	03,24' N	015°	15,26' W	3590,0	
		10:50	Releaser	29°	02,99' N	015°	15,36' W	3588,0	
807	25.11.	15:36	top buoy recognized	29°	12,86' N	015°	50,53' W	3626,0	Recovery MSD-5
		15:56	top buoy	29°	12,86' N	015°	50,99' W	3626,0	
		16:00	particle trap	29°	12,83' N	015°	50,99' W	3626,0	
		17:24	releasers	29°	11,87' N	015°	51,14' W	3626,0	
808	26.11.	10:09	top buoy	29°	02,06' N	015°	15,57' W	3590,0	Deployment CI-19
		10:13	1. particle trap	29°	02,11' N	015°	15,57' W	3593,0	
		10:32	2. particle trap	29°	02,36' N	015°	15,48' W	3591,0	
		10:56	3. particle trap	29°	04,20' N	015°	15,10' W	3590,0	
		12:24	releasers	29°	04,70' N	015°	14,98' W	3590,0	
		12:34	mooring weight	29°	04,78' N	015°	14,96' W	3590,0	
809	26.11.	17:17	CTD/Rosette	29°	11,83' N	015°	55,25' W	3628,0	Pre-Calibration Microcats
809-2	26.11.	18:41	CTD/Rosette	29°	11,97' N	015°	55,04' W	3628,0	Pre-Calibration Fluorometer
810	27.11.	13:50	Swivel+Microcat	29°	10,49' N	015°	55,36' W	3628,0	Deployment DOLAN buoy
		13:54	MicroCat	29°	10,44' N	015°	55,34' W	3628,0	
		13:54	NAS Nutrient Sensor	29°	10,44' N	015°	55,34' W	3628,0	
		14:02	1. MicroCat	29°	10,36' N	015°	55,32' W	3628,0	
		14:09	2. MicroCat	29°	10,30' N	015°	55,29' W	3627,0	
		14:15	3. MicroCat	29°	10,23' N	015°	55,22' W	3628,0	
		15:05	MicroCat	29°	10,29' N	015°	55,17' W	3627,0	
		15:16	DOLAN buoy	29°	10,26' N	015°	55,15' W	3627,0	
811	28.11.	08:08	CTD/Rosette	29°	00,44' N	015°	19,78' W	3597,0	
		11:09	finish of scientific work due to cyclonic storm "Delta"						

6. Acknowledgement

All scientific cruise participants thank Captain Michael Schneider and his entire crew for the flexible and friendly assistance during the R/V POSEIDON cruise 330. Again it was a good example of professional support and handling.

The teamwork among the crew and scientists was friendly and relaxed as known from several other cruises on R/V POSEIDON. The cruise could be realized successfully.

7. References

- GARSDIE C. (1993) Nitrate reductor efficiency as an error source in seawater analysis, *Mar. Chem.*, **4**(1), 25-30.
- KOROLEFF F. (1983) Determination of dissolved inorganic phosphate. In *Methods of Seawater Analysis*. K. Grasshoff, A. Ehrhardt and K. Kremling (eds), Verlag Chemie, 126-129.
- KOROLEFF F. (1983b) Determination of dissolved inorganic silicate. In *Methods of Seawater Analysis*, K. Grasshoff, A. Ehrhardt and K. Kremling (eds), Verlag Chemie, 175-180.
- KREMLING K. & A. WENCK (1986) On the storage of dissolved inorganic phosphate, nitrate and reactive silicate in Atlantic Ocean water samples, *Meeresforschung*, **31**, 69-74.
- LINAS O. ET AL. (2002) Variability of the Antarctic Intermediate Waters in the Northern Canary Box. *Deep Sea Research. II*, **49**(17):3441-3453.
- MCDONALD R.W. & F.A. MCLAUGHLIN (1982) The effect of storage by freezing of dissolved inorganic phosphate, nitrate and reactive silicate for samples from coastal and internal water, *Water Research*, **16**, 95-104.
- MURPHY J. & J.P. RILEY (1962) A modified single solution method for the determination of phosphate in natural waters, *Anal. Chim. Acta*, **27**, 31-36.
- NYDAHL F. (1976) On the optimum conditions for the reduction of nitrate by cadmium, *Talanta*, **23**, 349-357.
- RILEY J.P. & J.P. SKIRPOW (1975) The Micronutrient Element, *Chemical Oceanography*, **2**, 245-297.
- STRICKLAND J.D.H & PARSONS (1972) A practical handbook of seawater analysis, *Fisheries Research Board of Canada*, 167 pp.
- UNESCO (1978) Technical Papers in Marine Science, **28**, 35pp.
- UNESCO (1984) La escala de salinidades practicas de 1978 y la ecuacion internacional de estado del agua de mar de 1980, Documentos tecnicos de la Unesco sobre Ciencias del Mar, no. **36**.
- WELSCHMEYER N.A. (1994) Fluorimetric Analysis of Chlorophyll a in presence of Chlorophyll b and Phaeopigments, *Limnol. Oceanog.* **39** (8), 1985-1992.
- WOODS E.D., ARMSTRONG F.A.J. & F.A. RICHARDS (1967) Determination of nitrate in seawater by cadmium-cooper reduction to nitrite, *J. Mar. Biol. Ass. UK.*, **47**, 31-43.

Publications of this series:

- No. 1 Wefer, G., E. Suess and cruise participants**
Bericht über die POLARSTERN-Fahrt ANT IV/2, Rio de Janeiro - Punta Arenas, 6.11. - 1.12.1985.
60 pages, Bremen, 1986.
- No. 2 Hoffmann, G.**
Holozänstratigraphie und Küstenlinienverlagerung an der andalusischen Mittelmeerküste.
173 pages, Bremen, 1988. (out of print)
- No. 3 Wefer, G. and cruise participants**
Bericht über die METEOR-Fahrt M 6/6, Libreville - Las Palmas, 18.2. - 23.3.1988.
97 pages, Bremen, 1988.
- No. 4 Wefer, G., G.F. Lutze, T.J. Müller, O. Pfannkuche, W. Schenke, G. Siedler, W. Zenk**
Kurzbericht über die METEOR-Expedition No. 6, Hamburg - Hamburg, 28.10.1987 - 19.5.1988.
29 pages, Bremen, 1988. (out of print)
- No. 5 Fischer, G.**
Stabile Kohlenstoff-Isotope in partikulärer organischer Substanz aus dem Südpolarmeer (Atlantischer Sektor).
161 pages, Bremen, 1989.
- No. 6 Berger, W.H. and G. Wefer**
Partikelfluß und Kohlenstoffkreislauf im Ozean.
Bericht und Kurzfassungen über den Workshop vom 3.-4. Juli 1989 in Bremen.
57 pages, Bremen, 1989.
- No. 7 Wefer, G. and cruise participants**
Bericht über die METEOR - Fahrt M 9/4, Dakar - Santa Cruz, 19.2. - 16.3.1989.
103 pages, Bremen, 1989.
- No. 8 Kölling, M.**
Modellierung geochemischer Prozesse im Sickerwasser und Grundwasser.
135 pages, Bremen, 1990.
- No. 9 Heinze, P.-M.**
Das Auftriebsgeschehen vor Peru im Spätquartär.
204 pages, Bremen, 1990. (out of print)
- No. 10 Willems, H., G. Wefer, M. Rinski, B. Donner, H.-J. Bellmann, L. Eißmann, A. Müller, B.W. Flemming, H.-C. Höfle, J. Merkt, H. Streif, G. Hertweck, H. Kuntze, J. Schwaar, W. Schäfer, M.-G. Schulz, F. Grube, B. Menke**
Beiträge zur Geologie und Paläontologie Norddeutschlands: Exkursionsführer.
202 pages, Bremen, 1990.
- No. 11 Wefer, G. and cruise participants**
Bericht über die METEOR-Fahrt M 12/1, Kapstadt - Funchal, 13.3.1990 - 14.4.1990.
66 pages, Bremen, 1990.
- No. 12 Dahmke, A., H.D. Schulz, A. Kölling, F. Kracht, A. Lücke**
Schwermetallspuren und geochemische Gleichgewichte zwischen Porenlösung und Sediment im Wesermündungsgebiet. BMFT-Projekt MFU 0562, Abschlußbericht.
121 pages, Bremen, 1991.
- No. 13 Rostek, F.**
Physikalische Strukturen von Tiefseesedimenten des Südatlantiks und ihre Erfassung in Echolotregistrierungen.
209 pages, Bremen, 1991.
- No. 14 Baumann, M.**
Die Ablagerung von Tschernobyl-Radiocäsium in der Norwegischen See und in der Nordsee.
133 pages, Bremen, 1991. (out of print)
- No. 15 Kölling, A.**
Frühdiaagenetische Prozesse und Stoff-Flüsse in marinen und ästuarinen Sedimenten.
140 pages, Bremen, 1991.
- No. 16 SFB 261 (ed.)**
1. Kolloquium des Sonderforschungsbereichs 261 der Universität Bremen (14.Juni 1991):
Der Südatlantik im Spätquartär: Rekonstruktion von Stoffhaushalt und Stromsystemen.
Kurzfassungen der Vorträge und Poster.
66 pages, Bremen, 1991.

- No. 17 Pätzold, J. and cruise participants**
Bericht und erste Ergebnisse über die METEOR-Fahrt M 15/2, Rio de Janeiro - Vitoria, 18.1. - 7.2.1991.
46 pages, Bremen, 1993.
- No. 18 Wefer, G. and cruise participants**
Bericht und erste Ergebnisse über die METEOR-Fahrt M 16/1, Pointe Noire - Recife, 27.3. - 25.4.1991.
120 pages, Bremen, 1991.
- No. 19 Schulz, H.D. and cruise participants**
Bericht und erste Ergebnisse über die METEOR-Fahrt M 16/2, Recife - Belem, 28.4. - 20.5.1991.
149 pages, Bremen, 1991.
- No. 20 Berner, H.**
Mechanismen der Sedimentbildung in der Fram-Straße, im Arktischen Ozean und in der Norwegischen See.
167 pages, Bremen, 1991.
- No. 21 Schneider, R.**
Spätquartäre Produktivitätsänderungen im östlichen Angola-Becken: Reaktion auf Variationen im Passat-Monsun-Windsystem und in der Advektion des Benguela-Küstenstroms.
198 pages, Bremen, 1991. (out of print)
- No. 22 Hebbeln, D.**
Spätquartäre Stratigraphie und Paläozooarchäologie in der Fram-Straße.
174 pages, Bremen, 1991.
- No. 23 Lücke, A.**
Umsetzungsprozesse organischer Substanz während der Frühdiagenese in ästuarinen Sedimenten.
137 pages, Bremen, 1991.
- No. 24 Wefer, G. and cruise participants**
Bericht und erste Ergebnisse der METEOR-Fahrt M 20/1, Bremen - Abidjan, 18.11.- 22.12.1991.
74 pages, Bremen, 1992.
- No. 25 Schulz, H.D. and cruise participants**
Bericht und erste Ergebnisse der METEOR-Fahrt M 20/2, Abidjan - Dakar, 27.12.1991 - 3.2.1992.
173 pages, Bremen, 1992.
- No. 26 Ginge, F.**
Zur klimaabhängigen Bildung biogener und terrigener Sedimente und ihrer Veränderung durch die Frühdiagenese im zentralen und östlichen Südatlantik.
202 pages, Bremen, 1992.
- No. 27 Bickert, T.**
Rekonstruktion der spätquartären Bodenwasserzirkulation im östlichen Südatlantik über stabile Isotope benthischer Foraminiferen. 205 pages, Bremen, 1992. (out of print)
- No. 28 Schmidt, H.**
Der Benguela-Strom im Bereich des Walfisch-Rückens im Spätquartär.
172 pages, Bremen, 1992.
- No. 29 Meinecke, G.**
Spätquartäre Oberflächenwassertemperaturen im östlichen äquatorialen Atlantik.
181 pages, Bremen, 1992.
- No. 30 Bathmann, U., U. Bleil, A. Dahmke, P. Müller, A. Nehrke, E.-M. Nöthig, M. Olesch, J. Pätzold, H.D. Schulz, V. Smetacek, V. Spieß, G. Wefer, H. Willems**
Bericht des Graduierten Kollegs. Stoff-Flüsse in marinen Geosystemen.
Berichtszeitraum Oktober 1990 - Dezember 1992.
396 pages, Bremen, 1992.
- No. 31 Damm, E.**
Frühdiagenetische Verteilung von Schwermetallen in Schlicksedimenten der westlichen Ostsee.
115 pages, Bremen, 1992.
- No. 32 Antia, E.E.**
Sedimentology, Morphodynamics and Facies Association of a mesotidal Barrier Island Shoreface (Spiekeroog, Southern North Sea).
370 pages, Bremen, 1993.
- No. 33 Duinker, J. and G. Wefer (ed.)**
Bericht über den 1. JGOFS-Workshop. 1./2. Dezember 1992 in Bremen.
83 pages, Bremen, 1993.
- No. 34 Kasten, S.**
Die Verteilung von Schwermetallen in den Sedimenten eines stadtbremischen Hafenbeckens.
103 pages, Bremen, 1993.

- No. 35** **Spieß, V.**
Digitale Sedimentographie. Neue Wege zu einer hochauflösenden Akustostratigraphie.
199 pages, Bremen, 1993.
- No. 36** **Schinzl, U.**
Laborversuche zu frühdiagenetischen Reaktionen von Eisen (III) - Oxidhydraten in marinen Sedimenten.
189 pages, Bremen, 1993.
- No. 37** **Sieger, R.**
CoTAM - ein Modell zur Modellierung des Schwermetalltransports in Grundwasserleitern.
56 pages, Bremen, 1993. (out of print)
- No. 38** **Willems, H. (ed.)**
Geoscientific Investigations in the Tethyan Himalayas. 183 pages, Bremen, 1993.
- No. 39** **Hamer, K.**
Entwicklung von Laborversuchen als Grundlage für die Modellierung des Transportverhaltens von Arsenat, Blei, Cadmium und Kupfer in wassergesättigten Säulen.
147 pages, Bremen, 1993.
- No. 40** **Sieger, R.**
Modellierung des Stofftransports in porösen Medien unter Ankopplung kinetisch gesteuerter Sorptions- und Redoxprozesse sowie thermischer Gleichgewichte.
158 pages, Bremen, 1993.
- No. 41** **Thießen, W.**
Magnetische Eigenschaften von Sedimenten des östlichen Südatlantiks und ihre paläozooanographische Relevanz.
170 pages, Bremen, 1993.
- No. 42** **Spieß, V. and cruise participants**
Report and preliminary results of METEOR-Cruise M 23/1, Kapstadt - Rio de Janeiro, 4.-25.2.1993.
139 pages, Bremen, 1994.
- No. 43** **Bleil, U. and cruise participants**
Report and preliminary results of METEOR-Cruise M 23/2, Rio de Janeiro - Recife, 27.2.-19.3.1993
133 pages, Bremen, 1994.
- No. 44** **Wefer, G. and cruise participants**
Report and preliminary results of METEOR-Cruise M 23/3, Recife - Las Palmas, 21.3. - 12.4.1993
71 pages, Bremen, 1994.
- No. 45** **Giese, M. and G. Wefer (ed.)**
Bericht über den 2. JGOFS-Workshop. 18./19. November 1993 in Bremen.
93 pages, Bremen, 1994.
- No. 46** **Balzer, W. and cruise participants**
Report and preliminary results of METEOR-Cruise M 22/1, Hamburg - Recife, 22.9. - 21.10.1992.
24 pages, Bremen, 1994.
- No. 47** **Stax, R.**
Zyklische Sedimentation von organischem Kohlenstoff in der Japan See: Anzeiger für Änderungen von Paläozooanographie und Paläoklima im Spätkänozoikum.
150 pages, Bremen, 1994.
- No. 48** **Skowronek, F.**
Frühdiagenetische Stoff-Flüsse gelöster Schwermetalle an der Oberfläche von Sedimenten des Weser Ästuars.
107 pages, Bremen, 1994.
- No. 49** **Dersch-Hansmann, M.**
Zur Klimaentwicklung in Ostasien während der letzten 5 Millionen Jahre:
Terrigener Sedimenteintrag in die Japan See (ODP Ausfahrt 128).
149 pages, Bremen, 1994.
- No. 50** **Zabel, M.**
Frühdiagenetische Stoff-Flüsse in Oberflächen-Sedimenten des äquatorialen und östlichen Südatlantik.
129 pages, Bremen, 1994.
- No. 51** **Bleil, U. and cruise participants**
Report and preliminary results of SONNE-Cruise SO 86, Buenos Aires - Capetown, 22.4. - 31.5.93
116 pages, Bremen, 1994.

- No. 52** **Symposium: The South Atlantic: Present and Past Circulation.**
Bremen, Germany, 15 - 19 August 1994. Abstracts.
167 pages, Bremen, 1994.
- No. 53** **Kretzmann, U.B.**
⁵⁷Fe-Mössbauer-Spektroskopie an Sedimenten - Möglichkeiten und Grenzen.
183 pages, Bremen, 1994.
- No. 54** **Bachmann, M.**
Die Karbonatrampe von Organyà im oberen Oberapt und unteren Unteralt (NE-Spanien, Prov. Lerida): Fazies, Zyklo- und Sequenzstratigraphie.
147 pages, Bremen, 1994. (out of print)
- No. 55** **Kemle-von Mücke, S.**
Oberflächenwasserstruktur und -zirkulation des Südostatlantiks im Spätquartär.
151 pages, Bremen, 1994.
- No. 56** **Petermann, H.**
Magnetotaktische Bakterien und ihre Magnetosome in Oberflächensedimenten des Südatlantiks.
134 pages, Bremen, 1994.
- No. 57** **Mulitz, S.**
Spätquartäre Variationen der oberflächennahen Hydrographie im westlichen äquatorialen Atlantik.
97 pages, Bremen, 1994.
- No. 58** **Segl, M. and cruise participants**
Report and preliminary results of METEOR-Cruise M 29/1, Buenos-Aires - Montevideo, 17.6. - 13.7.1994
94 pages, Bremen, 1994.
- No. 59** **Bleil, U. and cruise participants**
Report and preliminary results of METEOR-Cruise M 29/2, Montevideo - Rio de Janeiro 15.7. - 8.8.1994.
153 pages, Bremen, 1994.
- No. 60** **Henrich, R. and cruise participants**
Report and preliminary results of METEOR-Cruise M 29/3, Rio de Janeiro - Las Palmas 11.8. - 5.9.1994. Bremen, 1994. (out of print)
- No. 61** **Sagemann, J.**
Saisonale Variationen von Porenwasserprofilen, Nährstoff-Flüssen und Reaktionen in intertidalen Sedimenten des Weser-Ästuars.
110 pages, Bremen, 1994. (out of print)
- No. 62** **Giese, M. and G. Wefer**
Bericht über den 3. JGOFS-Workshop. 5./6. Dezember 1994 in Bremen.
84 pages, Bremen, 1995.
- No. 63** **Mann, U.**
Genese kretazischer Schwarzschiefer in Kolumbien: Globale vs. regionale/lokale Prozesse.
153 pages, Bremen, 1995. (out of print)
- No. 64** **Willems, H., Wan X., Yin J., Dongdui L., Liu G., S. Dürr, K.-U. Gräfe**
The Mesozoic development of the N-Indian passive margin and of the Xigaze Forearc Basin in southern Tibet, China. – Excursion Guide to IGCP 362 Working-Group Meeting "Integrated Stratigraphy".
113 pages, Bremen, 1995. (out of print)
- No. 65** **Hünken, U.**
Liefergebiets - Charakterisierung proterozoischer Goldseifen in Ghana anhand von Fluideinschluß-Untersuchungen.
270 pages, Bremen, 1995.
- No. 66** **Nyandwi, N.**
The Nature of the Sediment Distribution Patterns in the Spiekeroog Backbarrier Area, the East Frisian Islands.
162 pages, Bremen, 1995.
- No. 67** **Isenbeck-Schröter, M.**
Transportverhalten von Schwermetallkationen und Oxoanionen in wassergesättigten Sanden. - Laborversuche in Säulen und ihre Modellierung -
182 pages, Bremen, 1995.
- No. 68** **Hebbeln, D. and cruise participants**
Report and preliminary results of SONNE-Cruise SO 102, Valparaiso - Valparaiso, 95
134 pages, Bremen, 1995.

- No. 69** **Willems, H. (Sprecher), U. Bathmann, U. Bleil, T. v. Dobeneck, K. Herterich, B.B. Jorgensen, E.-M. Nöthig, M. Olesch, J. Pätzold, H.D. Schulz, V. Smetacek, V. Speiß, G. Wefer**
Bericht des Graduierten-Kollegs Stoff-Flüsse in marine Geosystemen.
Berichtszeitraum Januar 1993 - Dezember 1995.
45 & 468 pages, Bremen, 1995.
- No. 70** **Giese, M. and G. Wefer**
Bericht über den 4. JGOFS-Workshop. 20./21. November 1995 in Bremen.
60 pages, Bremen, 1996. (out of print)
- No. 71** **Meggers, H.**
Pliozän-quartäre Karbonatsedimentation und Paläozeanographie des Nordatlantiks und des Europäischen Nordmeeres - Hinweise aus planktischen Foraminiferengemeinschaften.
143 pages, Bremen, 1996. (out of print)
- No. 72** **Teske, A.**
Phylogenetische und ökologische Untersuchungen an Bakterien des oxidativen und reduktiven marinen Schwefelkreislaufs mittels ribosomaler RNA.
220 pages, Bremen, 1996. (out of print)
- No. 73** **Andersen, N.**
Biogeochemische Charakterisierung von Sinkstoffen und Sedimenten aus ostatlantischen Produktions-Systemen mit Hilfe von Biomarkern.
215 pages, Bremen, 1996.
- No. 74** **Treppke, U.**
Saisonalität im Diatomeen- und Silikoflagellatenfluß im östlichen tropischen und subtropischen Atlantik.
200 pages, Bremen, 1996.
- No. 75** **Schüring, J.**
Die Verwendung von Steinkohlebergematerialien im Deponiebau im Hinblick auf die Pyritverwitterung und die Eignung als geochemische Barriere.
110 pages, Bremen, 1996.
- No. 76** **Pätzold, J. and cruise participants**
Report and preliminary results of VICTOR HENSEN cruise JOPS II, Leg 6, Fortaleza - Recife, 10.3. - 26.3. 1995 and Leg 8, Vitoria - Vitoria, 10.4. - 23.4.1995.
87 pages, Bremen, 1996.
- No. 77** **Bleil, U. and cruise participants**
Report and preliminary results of METEOR-Cruise M 34/1, Cape Town - Walvis Bay, 3.-26.1.1996.
129 pages, Bremen, 1996.
- No. 78** **Schulz, H.D. and cruise participants**
Report and preliminary results of METEOR-Cruise M 34/2, Walvis Bay - Walvis Bay, 29.1.-18.2.96
133 pages, Bremen, 1996.
- No. 79** **Wefer, G. and cruise participants**
Report and preliminary results of METEOR-Cruise M 34/3, Walvis Bay - Recife, 21.2.-17.3.1996.
168 pages, Bremen, 1996.
- No. 80** **Fischer, G. and cruise participants**
Report and preliminary results of METEOR-Cruise M 34/4, Recife - Bridgetown, 19.3.-15.4.1996.
105 pages, Bremen, 1996.
- No. 81** **Kulbrok, F.**
Biostratigraphie, Fazies und Sequenzstratigraphie einer Karbonatrampe in den Schichten der Oberkreide und des Alttertiärs Nordost-Ägyptens (Eastern Desert, N'Golf von Suez, Sinai).
153 pages, Bremen, 1996.
- No. 82** **Kasten, S.**
Early Diagenetic Metal Enrichments in Marine Sediments as Documents of Nonsteady-State Depositional Conditions. Bremen, 1996.
- No. 83** **Holmes, M.E.**
Reconstruction of Surface Ocean Nitrate Utilization in the Southeast Atlantic Ocean Based on Stable Nitrogen Isotopes.
113 pages, Bremen, 1996.
- No. 84** **Rühlemann, C.**
Akkumulation von Carbonat und organischem Kohlenstoff im tropischen Atlantik: Spätquartäre Produktivitäts-Variationen und ihre Steuerungsmechanismen.
139 pages, Bremen, 1996.

- No. 85 Ratmeyer, V.**
Untersuchungen zum Eintrag und Transport lithogener und organischer partikulärer Substanz im östlichen subtropischen Nordatlantik.
154 pages, Bremen, 1996.
- No. 86 Cepek, M.**
Zeitliche und räumliche Variationen von Coccolithophoriden-Gemeinschaften im subtropischen Ost-Atlantik: Untersuchungen an Plankton, Sinkstoffen und Sedimenten.
156 pages, Bremen, 1996.
- No. 87 Otto, S.**
Die Bedeutung von gelöstem organischen Kohlenstoff (DOC) für den Kohlenstofffluß im Ozean.
150 pages, Bremen, 1996.
- No. 88 Hensen, C.**
Frühdiaagenetische Prozesse und Quantifizierung benthischer Stoff-Flüsse in Oberflächensedimenten des Südatlantiks.
132 pages, Bremen, 1996.
- No. 89 Giese, M. and G. Wefer**
Bericht über den 5. JGOFS-Workshop. 27./28. November 1996 in Bremen.
73 pages, Bremen, 1997.
- No. 90 Wefer, G. and cruise participants**
Report and preliminary results of METEOR-Cruise M 37/1, Lisbon - Las Palmas, 4.-23.12.1996.
79 pages, Bremen, 1997.
- No. 91 Isenbeck-Schröter, M., E. Bedbur, M. Kofod, B. König, T. Schramm & G. Mattheß**
Occurrence of Pesticide Residues in Water - Assessment of the Current Situation in Selected EU Countries.
65 pages, Bremen 1997.
- No. 92 Kühn, M.**
Geochemische Folgereaktionen bei der hydrogeothermalen Energiegewinnung.
129 pages, Bremen 1997.
- No. 93 Determann, S. & K. Herterich**
JGOFS-A6 "Daten und Modelle": Sammlung JGOFS-relevanter Modelle in Deutschland.
26 pages, Bremen, 1997.
- No. 94 Fischer, G. and cruise participants**
Report and preliminary results of METEOR-Cruise M 38/1, Las Palmas - Recife, 25.1.-1.3.1997, with Appendix: Core Descriptions from METEOR Cruise M 37/1. Bremen, 1997.
- No. 95 Bleil, U. and cruise participants**
Report and preliminary results of METEOR-Cruise M 38/2, Recife - Las Palmas, 4.3.-14.4.1997.
126 pages, Bremen, 1997.
- No. 96 Neuer, S. and cruise participants**
Report and preliminary results of VICTOR HENSEN-Cruise 96/1. Bremen, 1997.
- No. 97 Villinger, H. and cruise participants**
Fahrtbericht SO 111, 20.8. - 16.9.1996. 115 pages, Bremen, 1997.
- No. 98 Lüning, S.**
Late Cretaceous - Early Tertiary sequence stratigraphy, paleoecology and geodynamics of Eastern Sinai, Egypt.
218 pages, Bremen, 1997.
- No. 99 Haese, R.R.**
Beschreibung und Quantifizierung frühdiaagenetischer Reaktionen des Eisens in Sedimenten des Südatlantiks.
118 pages, Bremen, 1997.
- No. 100 Lührte, R. von**
Verwertung von Bremer Baggergut als Material zur Oberflächenabdichtung von Deponien - Geochemisches Langzeitverhalten und Schwermetall-Mobilität (Cd, Cu, Ni, Pb, Zn).
Bremen, 1997.
- No. 101 Ebert, M.**
Der Einfluß des Redoxmilieus auf die Mobilität von Chrom im durchströmten Aquifer.
135 pages, Bremen, 1997.
- No. 102 Krögel, F.**
Einfluß von Viskosität und Dichte des Seewassers auf Transport und Ablagerung von Wattsedimenten (Langeooger Rückseitenwatt, südliche Nordsee).
168 pages, Bremen, 1997.

- No. 103 Kerntopf, B.**
Dinoflagellate Distribution Patterns and Preservation in the Equatorial Atlantic and Offshore North-West Africa.
137 pages, Bremen, 1997.
- No. 104 Breitzke, M.**
Elastische Wellenausbreitung in marinen Sedimenten - Neue Entwicklungen der Ultraschall Sedimentphysik und Sedimentechographie.
298 pages, Bremen, 1997.
- No. 105 Marchant, M.**
Rezente und spätquartäre Sedimentation planktischer Foraminiferen im Peru-Chile Strom.
115 pages, Bremen, 1997.
- No. 106 Habicht, K.S.**
Sulfur isotope fractionation in marine sediments and bacterial cultures.
125 pages, Bremen, 1997.
- No. 107 Hamer, K., R.v. Lührte, G. Becker, T. Felis, S. Keffel, B. Strotmann, C. Waschkowitz, M. Kölling, M. Isenbeck-Schröter, H.D. Schulz**
Endbericht zum Forschungsvorhaben 060 des Landes Bremen: Baggergut der Hafengruppe Bremen-Stadt: Modelluntersuchungen zur Schwermetallmobilität und Möglichkeiten der Verwertung von Hafenschlick aus Bremischen Häfen.
98 pages, Bremen, 1997.
- No. 108 Greeff, O.W.**
Entwicklung und Erprobung eines benthischen Landersystemes zur *in situ*-Bestimmung von Sulfatreduktionsraten mariner Sedimente.
121 pages, Bremen, 1997.
- No. 109 Pätzold, M. und G. Wefer**
Bericht über den 6. JGOFS-Workshop am 4./5.12.1997 in Bremen. Im Anhang: Publikationen zum deutschen Beitrag zur Joint Global Ocean Flux Study (JGOFS), Stand 1/1998.
122 pages, Bremen, 1998.
- No. 110 Landenberger, H.**
CoTReM, ein Multi-Komponenten Transport- und Reaktions-Modell. 142 pages, Bremen, 1998.
- No. 111 Villinger, H. und Fahrtteilnehmer**
Fahrtbericht SO 124, 4.10. - 16.10.199.
90 pages, Bremen, 1997.
- No. 112 Gietl, R.**
Biostratigraphie und Sedimentationsmuster einer nordostägyptischen Karbonatrampe unter Berücksichtigung der Alveolinen-Faunen.
142 pages, Bremen, 1998.
- No. 113 Ziebis, W.**
The Impact of the Thalassinidean Shrimp *Callianassa truncata* on the Geochemistry of permeable, coastal Sediments.
158 pages, Bremen 1998.
- No. 114 Schulz, H.D. and cruise participants**
Report and preliminary results of METEOR-Cruise M 41/1, Málaga - Libreville, 13.2.-15.3.1998.
Bremen, 1998.
- No. 115 Völker, D.J.**
Untersuchungen an strömungsbeeinflussten Sedimentationsmustern im Südozean. Interpretation sedimentechographischer Daten und numerische Modellierung.
152 pages, Bremen, 1998.
- No. 116 Schlünz, B.**
Riverine Organic Carbon Input into the Ocean in Relation to Late Quaternary Climate Change.
136 pages, Bremen, 1998.
- No. 117 Kuhnert, H.**
Aufzeichnung des Klimas vor Westaustralien in stabilen Isotopen in Korallenskeletten.
109 pages, Bremen, 1998.
- No. 118 Kirst, G.**
Rekonstruktion von Oberflächenwassertemperaturen im östlichen Südatlantik anhand von Alkenonen.
130 pages, Bremen, 1998.
- No. 119 Dürkoop, A.**
Der Brasil-Strom im Spätquartär: Rekonstruktion der oberflächennahen Hydrographie während der letzten 400 000 Jahre.
121 pages, Bremen, 1998.

- No. 120** **Lamy, F.**
Spätquartäre Variationen des terrigenen Sedimenteintrags entlang des chilenischen Kontinentalhangs als Abbild von Klimavariabilität im Milanković- und Sub-Milanković-Zeitbereich.
141 pages, Bremen, 1998.
- No. 121** **Neuer, S. and cruise participants**
Report and preliminary results of POSEIDON-Cruise Pos 237/2, Vigo – Las Palmas, 18.3.-31.3.1998.
39 pages, Bremen, 1998
- No. 122** **Romero, O.E.**
Marine planktonic diatoms from the tropical and equatorial Atlantic: temporal flux patterns and the sediment record.
205 pages, Bremen, 1998.
- No. 123** **Spiess, V. und Fahrtteilnehmer**
Report and preliminary results of RV SONNE Cruise 125, Cochin – Chittagong, 17.10.-17.11.1997.
128 pages, Bremen, 1998.
- No. 124** **Arz, H.W.**
Dokumentation von kurzfristigen Klimaschwankungen des Spätquartärs in Sedimenten des westlichen äquatorialen Atlantiks.
96 pages, Bremen, 1998.
- No. 125** **Wolff, T.**
Mixed layer characteristics in the equatorial Atlantic during the late Quaternary as deduced from planktonic foraminifera.
132 pages, Bremen, 1998.
- No. 126** **Dittert, N.**
Late Quaternary Planktic Foraminifera Assemblages in the South Atlantic Ocean: Quantitative Determination and Preservational Aspects.
165 pages, Bremen, 1998.
- No. 127** **Höll, C.**
Kalkige und organisch-wandige Dinoflagellaten-Zysten in Spätquartären Sedimenten des tropischen Atlantiks und ihre palökologische Auswertbarkeit.
121 pages, Bremen, 1998.
- No. 128** **Hencke, J.**
Redoxreaktionen im Grundwasser: Etablierung und Verlagerung von Reaktionsfronten und ihre Bedeutung für die Spurenelement-Mobilität.
122 pages, Bremen 1998.
- No. 129** **Pätzold, J. and cruise participants**
Report and preliminary results of METEOR-Cruise M 41/3, Vitória, Brasil – Salvador de Bahia, Brasil, 18.4. - 15.5.1998. Bremen, 1999.
- No. 130** **Fischer, G. and cruise participants**
Report and preliminary results of METEOR-Cruise M 41/4, Salvador de Bahia, Brasil – Las Palmas, Spain, 18.5. – 13.6.1998. Bremen, 1999.
- No. 131** **Schlünz, B. und G. Wefer**
Bericht über den 7. JGOFS-Workshop am 3. und 4.12.1998 in Bremen. Im Anhang: Publikationen zum deutschen Beitrag zur Joint Global Ocean Flux Study (JGOFS), Stand 1/ 1999.
100 pages, Bremen, 1999.
- No. 132** **Wefer, G. and cruise participants**
Report and preliminary results of METEOR-Cruise M 42/4, Las Palmas - Las Palmas - Viena do Castelo; 26.09.1998 - 26.10.1998.
104 pages, Bremen, 1999.
- No. 133** **Felis, T.**
Climate and ocean variability reconstructed from stable isotope records of modern subtropical corals (Northern Red Sea).
111 pages, Bremen, 1999.
- No. 134** **Draschba, S.**
North Atlantic climate variability recorded in reef corals from Bermuda.
108 pages, Bremen, 1999.
- No. 135** **Schmieder, F.**
Magnetic Cyclostratigraphy of South Atlantic Sediments.
82 pages, Bremen, 1999.

- No. 136 Rieß, W.**
In situ measurements of respiration and mineralisation processes – Interaction between fauna and geochemical fluxes at active interfaces.
68 pages, Bremen, 1999.
- No. 137 Devey, C.W. and cruise participants**
Report and shipboard results from METEOR-cruise M 41/2, Libreville – Vitoria, 18.3. – 15.4.98.
59 pages, Bremen, 1999.
- No. 138 Wenzhöfer, F.**
Biogeochemical processes at the sediment water interface and quantification of metabolically driven calcite dissolution in deep sea sediments.
103 pages, Bremen, 1999.
- No. 139 Klump, J.**
Biogenic barite as a proxy of paleoproductivity variations in the Southern Peru-Chile Current.
107 pages, Bremen, 1999.
- No. 140 Huber, R.**
Carbonate sedimentation in the northern Northatlantic since the late pliocene.
103 pages, Bremen, 1999.
- No. 141 Schulz, H.**
Nitrate-storing sulfur bacteria in sediments of coastal upwelling.
94 pages, Bremen, 1999.
- No. 142 Mai, S.**
Die Sedimentverteilung im Wattenmeer: ein Simulationsmodell.
114 pages, Bremen, 1999.
- No. 143 Neuer, S. and cruise participants**
Report and preliminary results of Poseidon Cruise 248, Las Palmas - Las Palmas, 15.2.-26.2.1999.
45 pages, Bremen, 1999.
- No. 144 Weber, A.**
Schwefelkreislauf in marinen Sedimenten und Messung von *in situ* Sulfatreduktionsraten.
122 pages, Bremen, 1999.
- No. 145 Haderer, A.**
Sorptionsreaktionen im Grundwasser: Unterschiedliche Aspekte bei der Modellierung des Transportverhaltens von Zink.
122 pages, 1999.
- No. 146 Dierßen, H.**
Zum Kreislauf ausgewählter Spurenmetalle im Südatlantik: Vertikaltransport und Wechselwirkung zwischen Partikeln und Lösung.
167 pages, Bremen, 1999.
- No. 147 Zühlsdorff, L.**
High resolution multi-frequency seismic surveys at the Eastern Juan de Fuca Ridge Flank and the Cascadia Margin – Evidence for thermally and tectonically driven fluid upflow in marine sediments.
118 pages, Bremen 1999.
- No. 148 Kinkel, H.**
Living and late Quaternary Coccolithophores in the equatorial Atlantic Ocean: response of distribution and productivity patterns to changing surface water circulation.
183 pages, Bremen, 2000.
- No. 149 Pätzold, J. and cruise participants**
Report and preliminary results of METEOR Cruise M 44/3, Aqaba (Jordan) - Safaga (Egypt) – Dubá (Saudi Arabia) – Suez (Egypt) - Haifa (Israel), 12.3.-26.3.-2.4.-4.4.1999. 1
35 pages, Bremen, 2000.
- No. 150 Schlünz, B. and G. Wefer**
Bericht über den 8. JGOFS-Workshop am 2. und 3.12.1999 in Bremen. Im Anhang: Publikationen zum deutschen Beitrag zur Joint Global Ocean Flux Study (JGOFS), Stand 1/ 2000.
95 pages, Bremen, 2000.
- No. 151 Schnack, K.**
Biostratigraphie und fazielle Entwicklung in der Oberkreide und im Alttertiär im Bereich der Kharga Schwelle, Westliche Wüste, SW-Ägypten.
142 pages, Bremen, 2000.

- No. 152 Karwath, B.**
Ecological studies on living and fossil calcareous dinoflagellates of the equatorial and tropical Atlantic Ocean.
175 pages, Bremen, 2000.
- No. 153 Moustafa, Y.**
Paleoclimatic reconstructions of the Northern Red Sea during the Holocene inferred from stable isotope records of modern and fossil corals and molluscs.
102 pages, Bremen, 2000.
- No. 154 Villinger, H. and cruise participants**
Report and preliminary results of SONNE-cruise 145-1 Balboa – Talcahuana, 21.12.1999 – 28.01.2000.
147 pages, Bremen, 2000.
- No. 155 Rusch, A.**
Dynamik der Feinfraktion im Oberflächenhorizont permeabler Schelfsedimente.
102 pages, Bremen, 2000.
- No. 156 Moos, C.**
Reconstruction of upwelling intensity and paleo-nutrient gradients in the northwest Arabian Sea derived from stable carbon and oxygen isotopes of planktic foraminifera.
103 pages, Bremen, 2000.
- No. 157 Xu, W.**
Mass physical sediment properties and trends in a Wadden Sea tidal basin.
127 pages, Bremen, 2000.
- No. 158 Meinecke, G. and cruise participants**
Report and preliminary results of METEOR Cruise M 45/1, Malaga (Spain) - Lissabon (Portugal), 19.05. - 08.06.1999.
39 pages, Bremen, 2000.
- No. 159 Vink, A.**
Reconstruction of recent and late Quaternary surface water masses of the western subtropical Atlantic Ocean based on calcareous and organic-walled dinoflagellate cysts.
160 pages, Bremen, 2000.
- No. 160 Willems, H. (Sprecher), U. Bleil, R. Henrich, K. Herterich, B.B. Jørgensen, H.-J. Kuß, M. Olesch, H.D. Schulz, V. Spieß, G. Wefer**
Abschlußbericht des Graduierten-Kollegs Stoff-Flüsse in marine Geosystemen.
Zusammenfassung und Berichtszeitraum Januar 1996 - Dezember 2000.
340 pages, Bremen, 2000.
- No. 161 Sprengel, C.**
Untersuchungen zur Sedimentation und Ökologie von Coccolithophoriden im Bereich der Kanarischen Inseln: Saisonale Flussmuster und Karbonatexport.
165 pages, Bremen, 2000.
- No. 162 Donner, B. and G. Wefer**
Bericht über den JGOFS-Workshop am 18.-21.9.2000 in Bremen:
Biogeochemical Cycles: German Contributions to the International Joint Global Ocean Flux Study.
87 pages, Bremen, 2000.
- No. 163 Neuer, S. and cruise participants**
Report and preliminary results of Meteor Cruise M 45/5, Bremen – Las Palmas, October 1 – November 3, 1999.
93 pages, Bremen, 2000.
- No. 164 Devey, C. and cruise participants**
Report and preliminary results of Sonne Cruise SO 145/2, Talcahuano (Chile) - Arica (Chile), February 4 – February 29, 2000.
63 pages, Bremen, 2000.
- No. 165 Freudenthal, T.**
Reconstruction of productivity gradients in the Canary Islands region off Morocco by means of sinking particles and sediments.
147 pages, Bremen, 2000.
- No. 166 Adler, M.**
Modeling of one-dimensional transport in porous media with respect to simultaneous geochemical reactions in CoTReM.
147 pages, Bremen, 2000.

- No. 167** **Santamarina Cuneo, P.**
Fluxes of suspended particulate matter through a tidal inlet of the East Frisian Wadden Sea (southern North Sea).
91 pages, Bremen, 2000.
- No. 168** **Benthien, A.**
Effects of CO₂ and nutrient concentration on the stable carbon isotope composition of C_{37:2} alkenones in sediments of the South Atlantic Ocean.
104 pages, Bremen, 2001.
- No. 169** **Lavik, G.**
Nitrogen isotopes of sinking matter and sediments in the South Atlantic.
140 pages, Bremen, 2001.
- No. 170** **Budziak, D.**
Late Quaternary monsoonal climate and related variations in paleoproductivity and alkenone-derived sea-surface temperatures in the western Arabian Sea.
114 pages, Bremen, 2001.
- No. 171** **Gerhardt, S.**
Late Quaternary water mass variability derived from the pteropod preservation state in sediments of the western South Atlantic Ocean and the Caribbean Sea.
109 pages, Bremen, 2001.
- No. 172** **Bleil, U. and cruise participants**
Report and preliminary results of Meteor Cruise M 46/3, Montevideo (Uruguay) – Mar del Plata (Argentina), January 4 – February 7, 2000. Bremen, 2001.
- No. 173** **Wefer, G. and cruise participants**
Report and preliminary results of Meteor Cruise M 46/4, Mar del Plata (Argentina) – Salvador da Bahia (Brazil), February 10 – March 13, 2000. With partial results of METEOR cruise M 46/2.
136 pages, Bremen, 2001.
- No. 174** **Schulz, H.D. and cruise participants**
Report and preliminary results of Meteor Cruise M 46/2, Recife (Brazil) – Montevideo (Uruguay), December 2 – December 29, 1999.
107 pages, Bremen, 2001.
- No. 175** **Schmidt, A.**
Magnetic mineral fluxes in the Quaternary South Atlantic: Implications for the paleoenvironment.
97 pages, Bremen, 2001.
- No. 176** **Bruhns, P.**
Crystal chemical characterization of heavy metal incorporation in brick burning processes.
93 pages, Bremen, 2001.
- No. 177** **Karius, V.**
Baggergut der Hafengruppe Bremen-Stadt in der Ziegelherstellung.
131 pages, Bremen, 2001.
- No. 178** **Adegbie, A. T.**
Reconstruction of paleoenvironmental conditions in Equatorial Atlantic and the Gulf of Guinea Basins for the last 245,000 years.
113 pages, Bremen, 2001.
- No. 179** **Spieß, V. and cruise participants**
Report and preliminary results of R/V Sonne Cruise SO 149, Victoria - Victoria, 16.8. - 16.9.2000.
100 pages, Bremen, 2001.
- No. 180** **Kim, J.-H.**
Reconstruction of past sea-surface temperatures in the eastern South Atlantic and the eastern South Pacific across Termination I based on the Alkenone Method.
114 pages, Bremen, 2001.
- No. 181** **von Lom-Keil, H.**
Sedimentary waves on the Namibian continental margin and in the Argentine Basin – Bottom flow reconstructions based on high resolution echosounder data.
126 pages, Bremen, 2001.
- No. 182** **Hebbeln, D. and cruise participants**
PUCK: Report and preliminary results of R/V Sonne Cruise SO 156, Valparaiso (Chile) - Talcahuano (Chile), March 29 - May 14, 2001.
195 pages, Bremen, 2001.
- No. 183** **Wendler, J.**
Reconstruction of astronomically-forced cyclic and abrupt paleoecological changes in the Upper Cretaceous Boreal Realm based on calcareous dinoflagellate cysts.
149 pages, Bremen, 2001.

- No. 184 Volbers, A.**
Planktic foraminifera as paleoceanographic indicators: production, preservation, and reconstruction of upwelling intensity. Implications from late Quaternary South Atlantic sediments. 122 pages, Bremen, 2001.
- No. 185 Bleil, U. and cruise participants**
Report and preliminary results of R/V METEOR Cruise M 49/3, Montevideo (Uruguay) - Salvador (Brasil), March 9 - April 1, 2001. 99 pages, Bremen, 2001.
- No. 186 Scheibner, C.**
Architecture of a carbonate platform-to-basin transition on a structural high (Campanian-early Eocene, Eastern Desert, Egypt) – classical and modelling approaches combined. 173 pages, Bremen, 2001.
- No. 187 Schneider, S.**
Quartäre Schwankungen in Strömungsintensität und Produktivität als Abbild der Wassermassen-Variabilität im äquatorialen Atlantik (ODP Sites 959 und 663): Ergebnisse aus Siltkorn-Analysen. 134 pages, Bremen, 2001.
- No. 188 Uliana, E.**
Late Quaternary biogenic opal sedimentation in diatom assemblages in Kongo Fan sediments. 96 pages, Bremen, 2002.
- No. 189 Esper, O.**
Reconstruction of Recent and Late Quaternary oceanographic conditions in the eastern South Atlantic Ocean based on calcareous- and organic-walled dinoflagellate cysts. 130 pages, Bremen, 2001.
- No. 190 Wendler, I.**
Production and preservation of calcareous dinoflagellate cysts in the modern Arabian Sea. 117 pages, Bremen, 2002.
- No. 191 Bauer, J.**
Late Cenomanian – Santonian carbonate platform evolution of Sinai (Egypt): stratigraphy, facies, and sequence architecture. 178 pages, Bremen, 2002.
- No. 192 Hildebrand-Habel, T.**
Die Entwicklung kalkiger Dinoflagellaten im Südatlantik seit der höheren Oberkreide. 152 pages, Bremen, 2002.
- No. 193 Hecht, H.**
Sauerstoff-Optopoden zur Quantifizierung von Pyritverwitterungsprozessen im Labor- und Langzeit-in-situ-Einsatz. Entwicklung - Anwendung – Modellierung. 130 pages, Bremen, 2002.
- No. 194 Fischer, G. and cruise participants**
Report and Preliminary Results of RV METEOR-Cruise M49/4, Salvador da Bahia – Halifax, 4.4.-5.5.2001. 84 pages, Bremen, 2002.
- No. 195 Gröger, M.**
Deep-water circulation in the western equatorial Atlantic: inferences from carbonate preservation studies and silt grain-size analysis. 95 pages, Bremen, 2002.
- No. 196 Meinecke, G. and cruise participants**
Report of RV POSEIDON Cruise POS 271, Las Palmas - Las Palmas, 19.3.-29.3.2001. 19 pages, Bremen, 2002.
- No. 197 Meggers, H. and cruise participants**
Report of RV POSEIDON Cruise POS 272, Las Palmas - Las Palmas, 1.4.-14.4.2001. 19 pages, Bremen, 2002.
- No. 198 Gräfe, K.-U.**
Stratigraphische Korrelation und Steuerungsfaktoren Sedimentärer Zyklen in ausgewählten Borealen und Tethyalen Becken des Cenoman/Turon (Oberkreide) Europas und Nordwestafrikas. 197 pages, Bremen, 2002.
- No. 199 Jahn, B.**
Mid to Late Pleistocene Variations of Marine Productivity in and Terrigenous Input to the Southeast Atlantic. 97 pages, Bremen, 2002.

- No. 200** **Al-Rousan, S.**
Ocean and climate history recorded in stable isotopes of coral and foraminifers from the northern Gulf of Aqaba.
116 pages, Bremen, 2002.
- No. 201** **Azouzi, B.**
Regionalisierung hydraulischer und hydrogeochemischer Daten mit geostatistischen Methoden.
108 pages, Bremen, 2002.
- No. 202** **Spieß, V. and cruise participants**
Report and preliminary results of METEOR Cruise M 47/3, Libreville (Gabun) - Walvis Bay (Namibia),
01.06 - 03.07.2000. 70 pages, Bremen 2002.
- No. 203** **Spieß, V. and cruise participants**
Report and preliminary results of METEOR Cruise M 49/2, Montevideo (Uruguay) - Montevideo,
13.02 - 07.03.2001. 84 pages, Bremen 2002.
- No. 204** **Mollenhauer, G.**
Organic carbon accumulation in the South Atlantic Ocean: Sedimentary processes and glacial/interglacial Budgets.
139 pages, Bremen 2002.
- No. 205** **Spieß, V. and cruise participants**
Report and preliminary results of METEOR Cruise M49/1, Cape Town (South Africa) - Montevideo (Uruguay), 04.01.2000 - 10.02.2000.
57 pages, Bremen, 2003.
- No. 206** **Meier, K.J.S.**
Calcareous dinoflagellates from the Mediterranean Sea: taxonomy, ecology and palaeoenvironmental application.
126 pages, Bremen, 2003.
- No. 207** **Rakic, S.**
Untersuchungen zur Polymorphie und Kristallchemie von Silikaten der Zusammensetzung $\text{Me}_2\text{Si}_2\text{O}_5$ (Me:Na, K).
139 pages, Bremen, 2003.
- No. 208** **Pfeifer, K.**
Auswirkungen frühdiagenetischer Prozesse auf Calcit- und Barytgehalte in marinen Oberflächen-sedimenten. 110 pages, Bremen, 2003.
- No. 209** **Heuer, V.**
Spurenelemente in Sedimenten des Südatlantik. Primärer Eintrag und frühdiagenetische Überprägung.
136 pages, Bremen, 2003.
- No. 210** **Streng, M.**
Phylogenetic Aspects and Taxonomy of Calcareous Dinoflagellates.
157 pages, Bremen 2003.
- No. 211** **Boeckel, B.**
Present and past coccolith assemblages in the South Atlantic: implications for species ecology, carbonate contribution and palaeoceanographic applicability.
157 pages, Bremen, 2003.
- No. 212** **Precht, E.**
Advective interfacial exchange in permeable sediments driven by surface gravity waves and its ecological consequences. 131 pages, Bremen, 2003.
- No. 213** **Frenz, M.**
Grain-size composition of Quaternary South Atlantic sediments and its paleoceanographic significance.
123 pages, Bremen, 2003.
- No. 214** **Meggers, H. and cruise participants**
Report and preliminary results of METEOR Cruise M 53/1, Limassol - Las Palmas – Mindelo,
30.03.2002 - 03.05.2002.
81 pages, Bremen, 2003.
- No. 215** **Schulz, H.D. and cruise participants**
Report and preliminary results of METEOR Cruise M 58/1, Dakar – Las Palmas, 15.04..2003 - 12.05.2003. Bremen, 2003.

- No. 216 Schneider, R. and cruise participants**
Report and preliminary results of METEOR Cruise M 57/1, Cape Town – Walvis Bay, 20.01. – 08.02.2003.
123 pages, Bremen, 2003.
- No. 217 Kallmeyer, J.**
Sulfate reduction in the deep Biosphere.
157 pages, Bremen, 2003.
- No. 218 Røy, H.**
Dynamic Structure and Function of the Diffusive Boundary Layer at the Seafloor.
149 pages, Bremen, 2003.
- No. 219 Pätzold, J., C. Hübscher and cruise participants**
Report and preliminary results of METEOR Cruise M 52/2&3, Istanbul – Limassol – Limassol, 04.02. – 27.03.2002. Bremen, 2003.
- No. 220 Zabel, M. and cruise participants**
Report and preliminary results of METEOR Cruise M 57/2, Walvis Bay – Walvis Bay, 11.02. – 12.03.2003.
136 pages, Bremen 2003.
- No. 221 Salem, M.**
Geophysical investigations of submarine prolongations of alluvial fans on the western side of the Gulf of Aqaba-Red Sea.
100 pages, Bremen, 2003.
- No. 222 Tilch, E.**
Oszillation von Wattflächen und deren fossiles Erhaltungspotential (Spiekerooger Rückseitenwatt, südliche Nordsee).
137 pages, Bremen, 2003.
- No. 223 Frisch, U. and F. Kockel**
Der Bremen-Knoten im Strukturnetz Nordwest-Deutschlands. Stratigraphie, Paläogeographie, Strukturgeologie.
379 pages, Bremen, 2004.
- No. 224 Kolonic, S.**
Mechanisms and biogeochemical implications of Cenomanian/Turonian black shale formation in North Africa: An integrated geochemical, millennial-scale study from the Tarfaya-LaAyoune Basin in SW Morocco.
174 pages, Bremen, 2004. Report online available only.
- No. 225 Panteleit, B.**
Geochemische Prozesse in der Salz- Süßwasser Übergangszone. 106 pages, Bremen, 2004.
- No. 226 Seiter, K.**
Regionalisierung und Quantifizierung benthischer Mineralisationsprozesse.
135 pages, Bremen, 2004.
- No. 227 Bleil, U. and cruise participants**
Report and preliminary results of METEOR Cruise M 58/2, Las Palmas – Las Palmas (Canary Islands, Spain), 15.05. – 08.06.2003.
123 pages, Bremen, 2004.
- No. 228 Kopf, A. and cruise participants**
Report and preliminary results of SONNE Cruise SO175, Miami - Bremerhaven, 12.11 - 30.12.2003.
218 pages, Bremen, 2004.
- No. 229 Fabian, M.**
Near Surface Tilt and Pore Pressure Changes Induced by Pumping in Multi-Layered Poroelastic Half-Spaces.
121 pages, Bremen, 2004.
- No. 230 Segl, M. and cruise participants**
Report and preliminary results of POSEIDON Cruise 304, Galway – Lisbon, 05.10 - 22.10.2004.
27 pages, Bremen, 2004.
- No. 231 Meinecke, G. and cruise participants**
Report and preliminary results of POSEIDON Cruise POS 296, Las Palmas – Las Palmas, 04.04 - 14.04.2003.
42 pages, Bremen, 2005.
- No. 232 Meinecke, G. and cruise participants**
Report and preliminary results of POSEIDON Cruise POS 310, Las Palmas – Las Palmas, 12.04 - 26.04.2004.
49 pages, Bremen, 2005.

- No. 233** **Meinecke, G. and cruise participants**
Report and preliminary results of METEOR Cruise M 58/3, Las Palmas – Ponta Delgada, 11.06 - 24.06.2003.
50 pages, Bremen, 2005.
- No. 234** **Feseker, T.**
Numerical Studies on Groundwater Flow in Coastal Aquifers,
219 pages., Bremen 2004
- No. 235** **Sahling, H. And cruise participants**
Report and preliminary results of POSEIDON Cruise POS 317/4, Istanbul-Istanbul, 16.10-04.11.2004.
92 pages, Bremen, 2004.
- No. 236** **Meinecke, G. and cruise participants**
Report and preliminary results of POSEIDON Cruise 305, Las Palmas – Lisbon, 28.10.-06.11.2003.
43 pages, Bremen, 2005.
- No. 237** **Ruhland, G. And cruise participants**
Report and preliminary results of POSEIDON Cruise 319, Las Palmas – Lisbon, 06.12.-17.12.2004.
43 pages, Bremen, 2005.
- No. 238** **Chang, T.S.**
Dynamics of fine-grained sediments and stratigraphic evolution of a back-barrier tidal basin of the German Wadden Sea (southern North Sea).
102 pages, Bremen 2005.
- No. 239** **Lager, T.**
Predicting the source strength of recycling materials within the scope of a seepage water prognosis by means of standardized laboratory methods.
141 pages, Bremen 2005.
- No. 240** **Meinecke, G.**
DOLAN - Operationelle Datenübertragung im Ozean und Laterales Akustisches Netzwerk in der Tiefsee. Abschlußbericht.
42 pages, Bremen 2005.
- No. 241** **Guasti, E.**
Early Paleogene environmental turnover in the southern Tethys as recorded by foraminiferal and organic-walled dinoflagellate cysts assemblages.
203 pages, Bremen 2005.
- No. 242** **Riedinger, N.**
Preservation and diagenetic overprint of geochemical and geophysical signals in ocean margin sediments related to depositional dynamics.
91 pages, Bremen 2005.
- No. 243** **Ruhland, G. and cruise participants**
Report and preliminary results of POSEIDON cruise 320, Las Palmas (Spain) - Las Palmas (Spain), March 08th - March 18th, 2005.
57 pages, Bremen 2005.
- No. 244** **Inthorn, M.**
Lateral particle transport in nepheloid layers – a key factor for organic matter distribution and quality in the Benguela high-productivity area.
127 pages, Bremen, 2006.
- No. 245** **Aspetsberger, F.**
Benthic carbon turnover in continental slope and deep sea sediments: importance of organic matter quality at different time scales.
136 pages, Bremen, 2006.
- No. 246** **Hebbeln, D. and cruise participants**
Report and preliminary results of RV SONNE Cruise SO-184, PABESIA, Durban (South Africa) – Cilacap (Indonesia) – Darwin (Australia), July 08th - September 13th, 2005.
142 pages, Bremen 2006.
- No. 247** **Ratmeyer, V. and cruise participants**
Report and preliminary results of RV METEOR Cruise M61/3. Development of Carbonate Mounds on the Celtic Continental Margin, Northeast Atlantic. Cork (Ireland) – Ponta Delgada (Portugal), 04.06. – 21.06.2004.
64 pages, Bremen 2006.

- No. 248** **Wien, K.**
Element Stratigraphy and Age Models for Pelagites and Gravity Mass Flow Deposits based on Shipboard XRF Analysis.
100 pages, Bremen 2006.
- No. 249** **Krastel, S. and cruise participants**
Report and preliminary results of RV METEOR Cruise M65/2, Dakar - Las Palmas, 04.07. - 26.07.2005.
185 pages, Bremen 2006.
- No. 250** **Heil, G.M.N.**
Abrupt Climate Shifts in the Western Tropical to Subtropical Atlantic Region during the Last glacial.
121 pages, Bremen 2006.